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MOSQUITO ATLAS

PART II

Eighteen Old World Anophelines
Important to Malaria



Published By
The American Entomological Society
The Academy of Natural Sciences
Philadelphia

1943

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PART II

Eighteen Old World Anophelines
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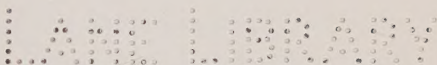
BY

Edward S. Ross

and

H. Radclyffe Roberts

First Lieutenants, Sanitary Corps,
Army of the United States



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CONTENTS

Acknowledgments.....	iv
Anopheles (Anopheles) sacharovi.....	1
Anopheles (Anopheles) claviger.....	3
Anopheles (Anopheles) hyrcanus.....	5
Anopheles (Anopheles) umbrosus.....	7
Anopheles (Myzomyia) annulipes.....	9
Anopheles (Myzomyia) punctulatus.....	11
Anopheles (Myzomyia) culicifacies.....	13
Anopheles (Myzomyia) funestus.....	15
Anopheles (Myzomyia) fluviatilis.....	17
Anopheles (Myzomyia) minimus.....	19
Anopheles (Myzomyia) subpictus.....	21
Anopheles (Myzomyia) sundaicus.....	23
Anopheles (Myzomyia) multicolor.....	25
Anopheles (Myzomyia) superpictus.....	27
Anopheles (Myzomyia) stephensi.....	29
Anopheles (Myzomyia) annularis.....	31
Anopheles (Myzomyia) maculatus.....	33
Anopheles (Myzomyia) pharoensis.....	35
List of Old World Anopheles.....	37
(Anopheles (Myzomyia) gambiae is treated in Part I, p. 39)	

FOREWORD

Part II of the Mosquito Atlas presents, in the manner outlined in the foreword of Part I, eighteen of the more important malaria vectors of the Old World. A number of additional species which are often mentioned as important vectors in malariological literature have not been treated because of their close similarity to certain of the species illustrated. The slight differential characters of such species will be mentioned in the comparative notes on the appropriate sheets. As a supplement to Part II, a systematic list of the *Anopheles* of the Old World has been compiled. This is primarily intended to indicate the relationships of the many species of the genus, and especially those treated here.

The lack or inadequacy of specimens of certain species handicapped the preparation of this second part of the Atlas. Several species important to malaria were necessarily omitted because of this lack of available material. In two cases certain larval hairs had to be omitted, because of the imperfect condition of the specimens at hand. In a number of drawings the outline of the larval head had to be taken from other related species for the same reason. Only in a few instances was it possible to select material from or reasonably near the type locality.

Again, as in Part I, it is desired to emphasize that each drawing is made from an individual specimen with its locality indicated. Therefore the drawings should be used as the equivalent of identified speci-

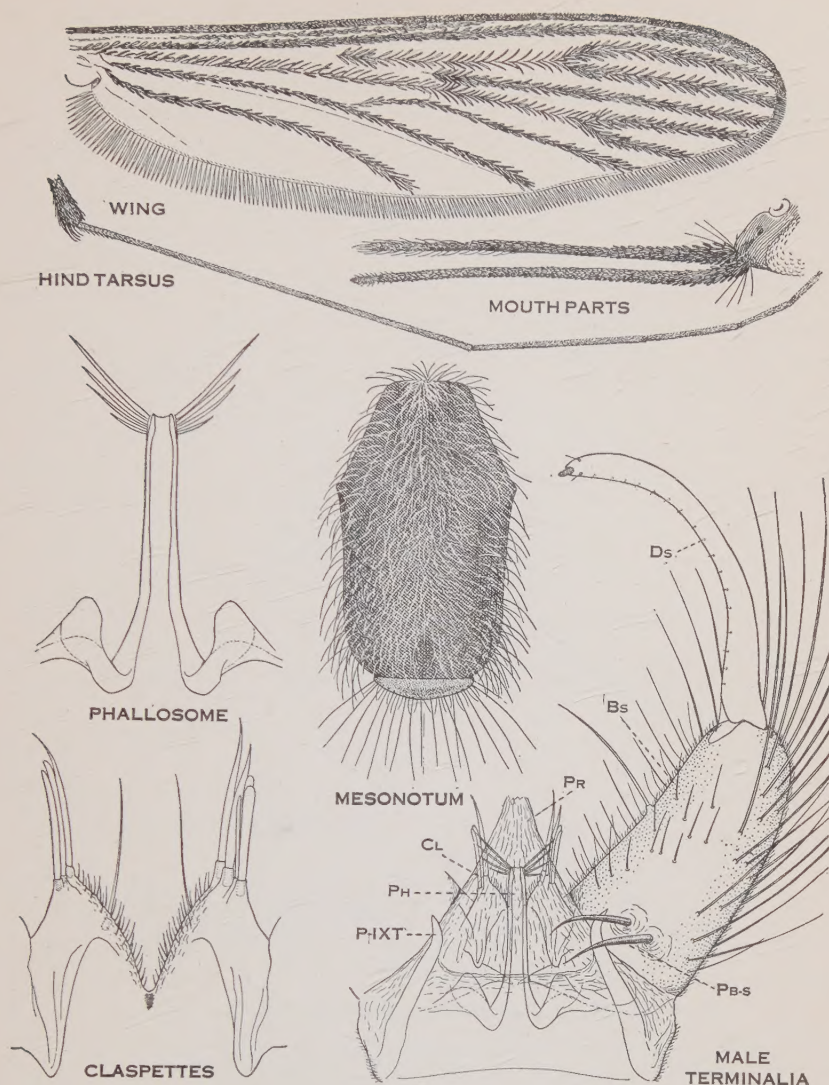
mens. Naturally due allowance should be made for a reasonable amount of variation. Since the species treated here will usually represent but a small fraction of those to be found in any particular region, the use of keys to the species of that region will be found very necessary, such as those by Russell, Rozeboom, and Stone, "Keys to the Anopheline Mosquitoes of the World," published by the American Entomological Society, Philadelphia, 1943.

The identification of the many *Anopheles* subspecies or "varieties" may cause considerable difficulty and warrants some discussion here. Although many valid, yet difficult to distinguish, subspecies do indeed exist in nature, culicidologists, perhaps, have been overzealous in proposing names for slightly differentiated populations within species. This tendency has undoubtedly been stimulated by the observation that a species may not be uniformly effective as a vector of malaria. The factors that produce this differing capacity are most likely physiological and environmental in nature and the correlated structural differences are often exceedingly minute. The question arises as to just what population elements should be recognized by name. Consideration of the human species, *Homo sapiens*, with its many races, nationalities, tribes, communities, and families, even down to the individual will bring out the point in question. From such an example that suggests the unlimited number of recognizable subdivisions that could be named, it becomes evident that some arbitrary and practical limit in naming must be drawn to prevent the taxonomy of a group becoming so complex that it is unusable. This example should indicate to the worker that at least some names appearing in the mosquito literature should be accepted with reservations, especially those of species from areas of the world where the faunas are not well known.

ACKNOWLEDGMENTS

Again we are greatly indebted to Brigadier General James Stevens Simmons, M. C., Chief, Division of Preventive Medicine, Office of the Surgeon General, U. S. Army, and Lieutenant Colonel Paul F. Russell, M. C., Chief, Tropical Disease Section of that office, for making it possible to continue this work. We have continued to use the facilities and collections of the U. S. National Museum in preparing Part II and are grateful to officials of that institution and of the Division of Insect Identification, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, for this privilege.

In addition we wish to express our thanks to the following individuals who assisted in the procurement of additional specimens for illustration: Dr. P. A. Buxton and Dr. V. B. Wigglesworth, both of the London School of Hygiene and Tropical Medicine; Major S. J. Carpenter, Fourth Service Command Laboratory, U. S. Army; Dr. J. C. Bequaert, Harvard Schools of Medicine and Public Health; and again Dr. L. E. Rozeboom. The Mark F. Boyd collection of mosquitoes at the Army Medical Center, Washington, D. C., was also made available.



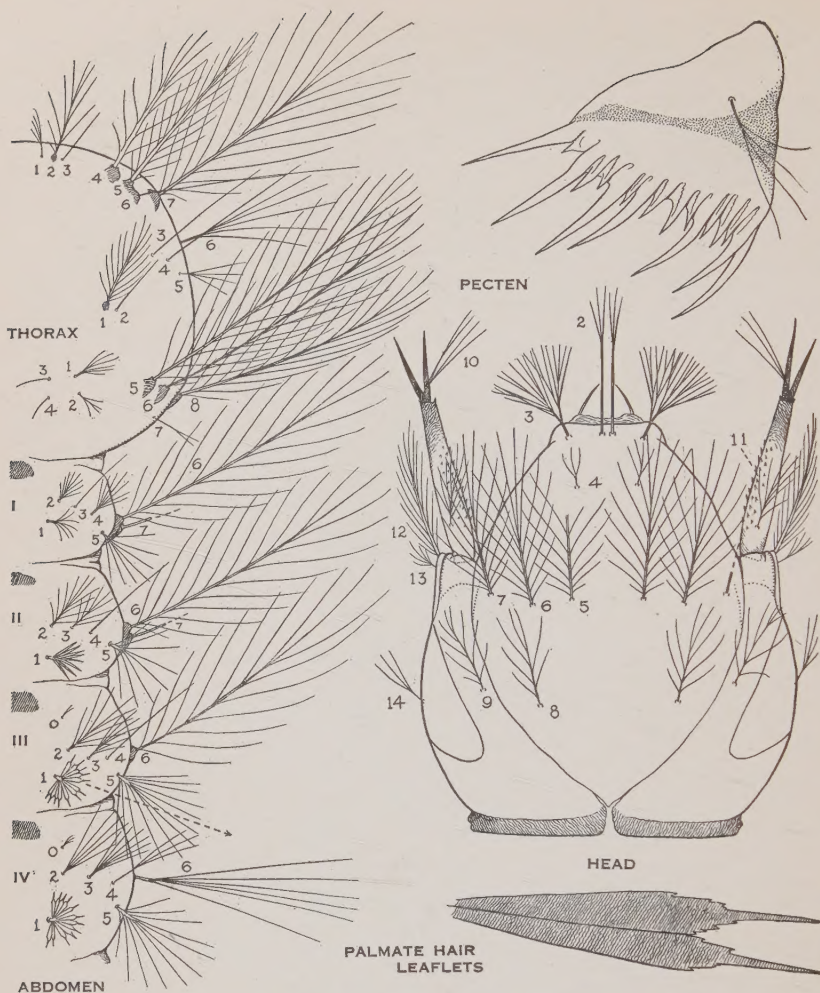
ANOPHELES (ANOPHELES) SACHAROVII Favr, 1903

An important vector of malaria in the Balkans and Palestine.

Identification. ADULT FEMALE: A large mosquito. Wings dark, with clusters of scales forming rather darker spots. Closely similar to other members of the *maculipennis* Complex of species except wing fringe at apex always dark. MALE TERMINALIA: dorso-lateral spines of claspettes either sharp or blunt; no defined dorsal and ventral lobes; processes of ninth tergite (P-IXT) narrow, sharply pointed; 2 parabasal spines (PB-s) only.

Habits. Enters human habitations where it persistently bites man in bedrooms; feeds indiscriminately on man and domestic animals.

Note. The subspecies and species of the *maculipennis* Complex are distinguished with greatest certainty by the egg characters. This species is recognized by the absence or great reduction of the egg float chambers.



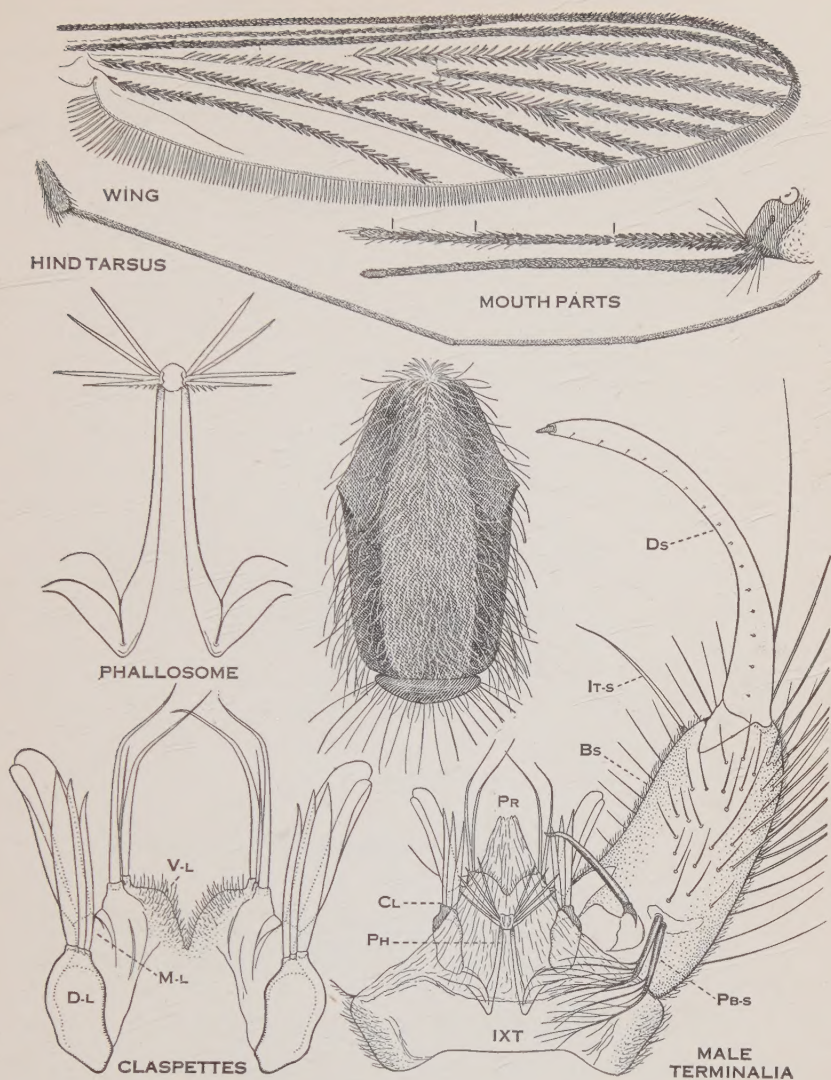
ANOPHELES (ANOPHELES) SACHAROVİ Favr, 1903

Identification. Larva closely similar to those of other species of the *maculipennis* Complex which are recognized by inner clypeal hairs (2) branched at tip and with their bases closely approximated; outer clypeals (3) densely branched, fan-shaped; antennal hair (11) branched, arising from basal quarter of antenna. Usually distinguishable from other forms by hair 2 of abdominal segments II and III with 9 or 10 branches. Hair 1, inconstant, sometimes palmate or branches slightly flattened as in *A. labbranchiae labbranchiae*.

Habitat. Occurs in coastal marshes, even if brackish, and inland marshes in midsummer.

Distribution. Italy (northeast and central coast), Sardinia, Balkans, Iran, Irak, Trans-Caucasus, central Russia, west China. Type locality: Elizabetpol, Caucasus, Russia.

Illustrated specimens from (adult female) Struma, Macedonia; (adult male) Macedonia; (larva) Sperchias Valley, Phthiotis, Greece.

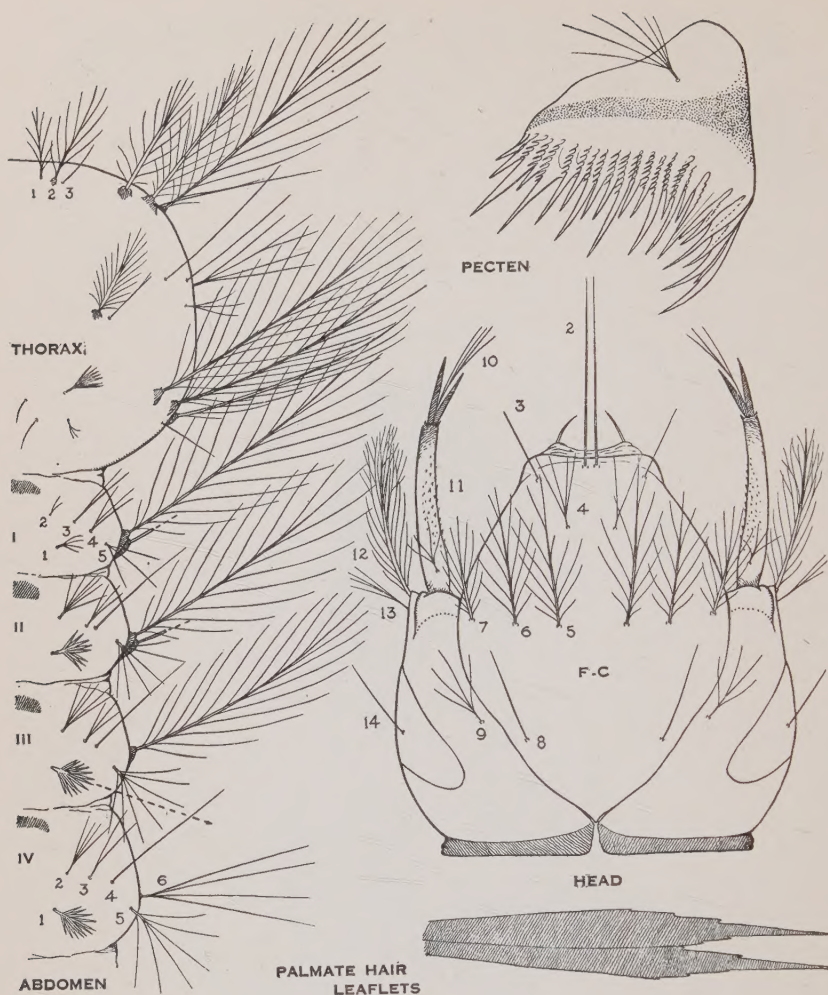


ANOPHELES (ANOPHELES) CLAVIGER (Meigen), 1804

An important vector of malaria in Syria and Palestine only.

Identification. A large brownish-gray species with palpi, wings and legs entirely dark. Mesonotum dark at sides and with pale stripe down middle. Wing veins without scale clusters forming dark spots as in *A. maculipennis* and other species. Apical segment of palpus less than $\frac{1}{2}$ length of preapical segment. In *A. plumbeus* it is more than $\frac{1}{2}$ length of preapical segment. **MALE TERMINALIA:** basistyle (Bs) with three parabasal spines (PB-s), two of which are heavily branched distad; internal spine (IT-s) close to apex of basistyle; claspettes divided into 3 lobes, ventral lobe (V-L) with 2 large and 1 very small spine, median lobe (M-L) with two blunt, thinly flattened processes, and the dorsal lobe (D-L) with 3 lanceolate blades; phallosome with four slender leaflets, the smallest one with characteristic serrations.

Habits. In Palestine and Syria the most common domestic species. In Europe readily bites man, but seldom indoors. Passes through winter usually in larval stage only.



ANOPHELES (ANOPHELES) CLAVIGER (Meigen), 1804

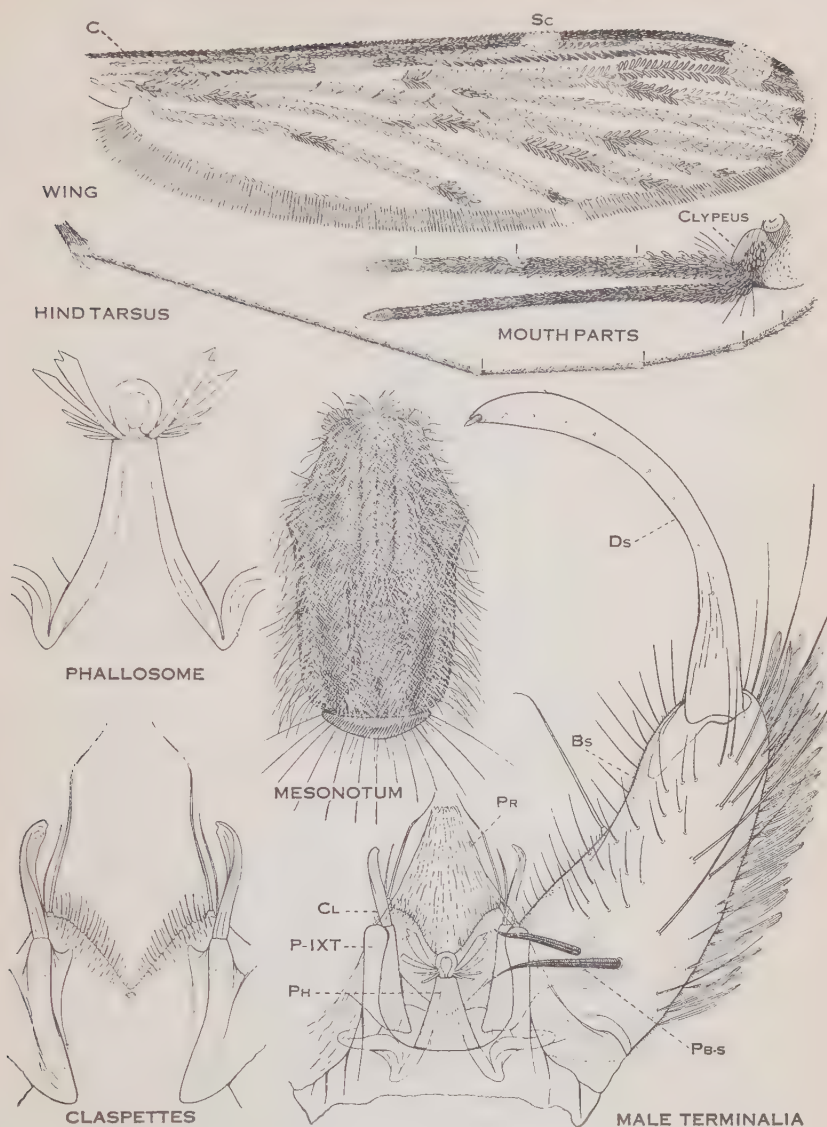
Identification. HEAD: inner clypeal hairs (2) simple or weakly branched, closely approximated; outer clypeals (3) simple or weakly branched, posterior clypeals (4) branched; dark markings of fronto-clypeus (F-C) formed as irregular spots, never transverse bars, as in *A. algeriensis*. ABDOMEN: palmate hair (1) of segment I weakly developed, hair-like; palmate hair leaflets of other segments tapered to apex rather than abruptly constricted with a slender apical filament; lateral hair of anal segment (IX) arising from below tergal plate or saddle (not figured).

Habitat. In Palestine and Syria breeds almost exclusively in basement rain-water cisterns and covered surface wells (Barraud, 1921). Elsewhere breeds in shady situations in cool permanent water usually among weedy vegetation. Has been found in water of moderate salinity.

Distribution. Europe and Mediterranean regions including Palestine and Syria. Type locality: "Europe."

Illustrated specimens from (adult female) Struma Valley, Macedonia; (adult male) Hamburg, Germany; (larva) Salonica, Macedonia.

Note. The name *A. bifurcatus* Linnaeus has long been erroneously applied to this species.

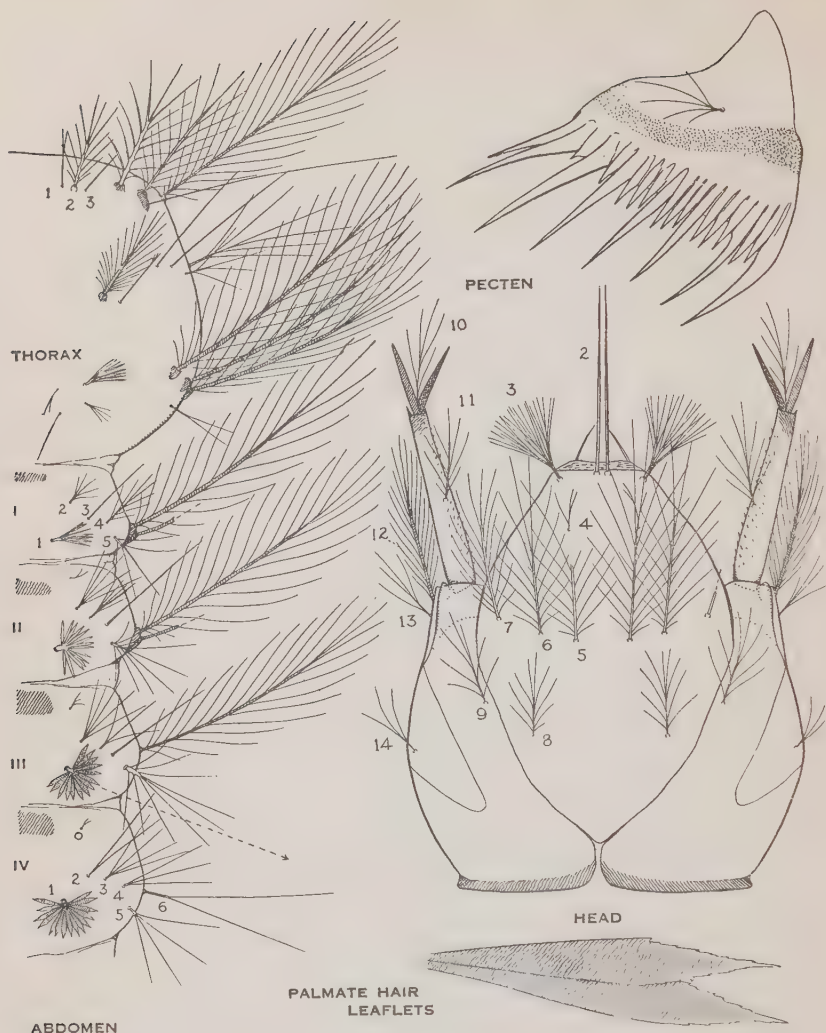


ANOPHELES (ANOPHELES) HYRCANUS (Pallas), 1771

An important vector of malaria in China, Japan, Korea, Formosa, Malaya (occasional), and Netherlands Indies, but not elsewhere. Also a vector of filariasis.

Identification. ADULT FEMALE: clypeus with a tuft of scales on either side. Palpus with one or more small but distinct whitish spots or rings. Wing with costa (C) entirely black on basal half; hind tarsi with pale rings on distal end of segments 1 to 4. Mesonotum with bronzy hairs. MALE TERMINALIA: basistyle (Bs) with 2 parabasal spines (Pb-s); process of 9th tergite (P-IXT) long and blunt at apex; dorsal lobe (D-L) of claspette with spines fused; phallosome (PH) leaflets highly variable in amount of notching or serration.

Habits. Not a domestic species and not commonly found resting in houses or cattle sheds; though readily bites man and cattle. Will bite in sunlight, but usually at dusk or at night. Adults often found resting in vegetation.



ANOPHELES (ANOPHELES) HYRCANUS (Pallas, 1771)

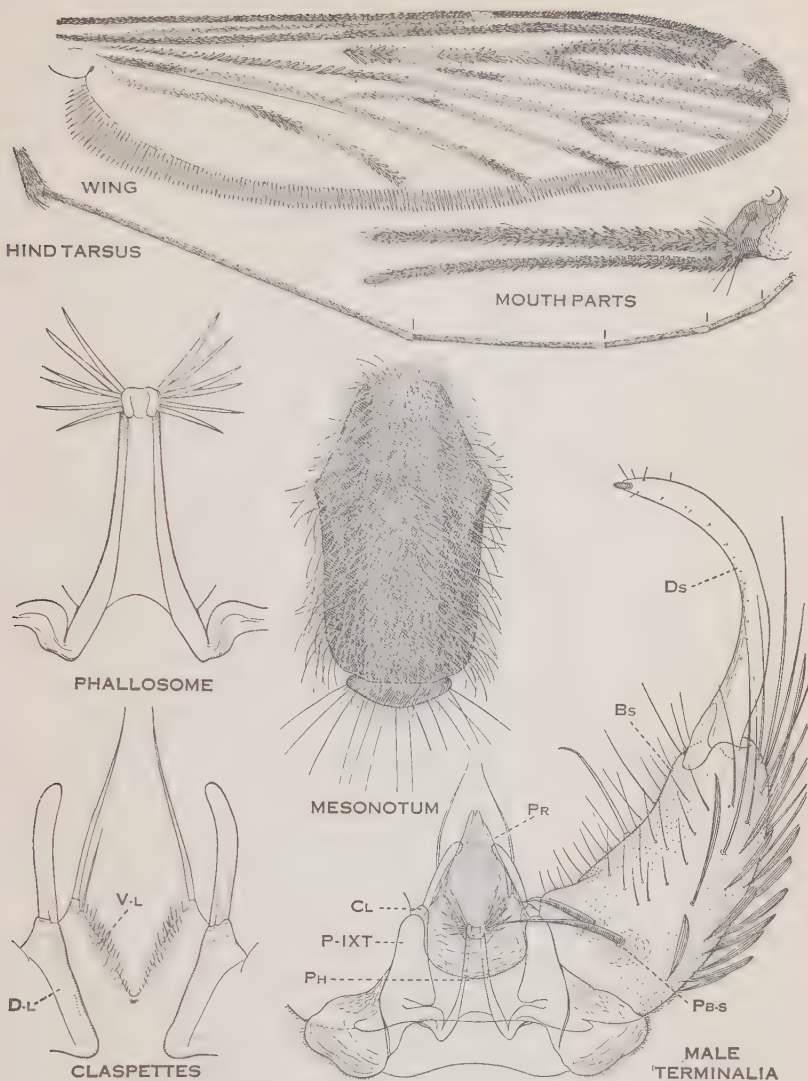
Identification. HEAD: inner clypeals (2) simple with their bases closely approximated; outer clypeals (3) densely branched, fan-shaped; antennal hair (11) many-branched, arising near middle of antennae. THORAX: prothoracic hair 1 simple or with distal end split into 2 or 3 branches. ABDOMEN: palmate hair (1) very weakly developed on segment I.

Habitat. Occurs under a wide variety of conditions including brackish water, commonly breeds in rice fields and swamps.

Distribution. Widespread throughout the Oriental Region, from Japan, Korea, China, Philippines, Borneo, Java, east through Mediterranean Region as far as Italy and Libya. Type locality: Salt marshes about Caspian Sea.

Illustrated specimens from (adults) Canton, China; (larva) Bioritsu, Formosa.

Note. *A. hyrcanus sinensis* Wiedemann (here illustrated) and *A. hyrcanus nigerrimus* Giles are the two most important subspecies. The latter is distinguished by a reduction in size of subcostal wing spot (Sc) and much broader banding of hind tarsi, with the two distal segments usually white at both base and apex. Larvae not readily separable.

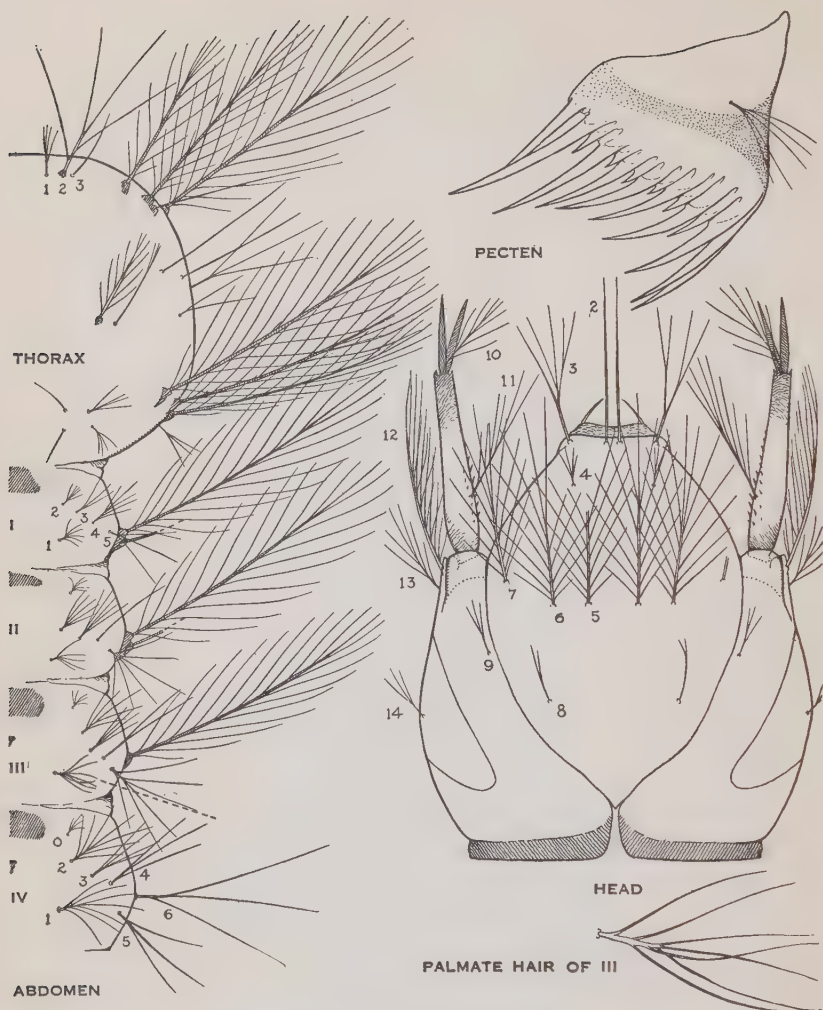


ANOPHELES (ANOPHELES) UMBROSUS Theobald, 1903

An important vector in Malaya, Borneo, and the Netherlands Indies.

Identification. ADULT FEMALE: Palpi entirely dark. Clypeus without scales. Inner half of costa entirely dark, no scattered pale scales. Hind tarsus with very narrow and inconspicuous pale bands. Abdomen without scales. MALE TERMINALIA: basistyle (Bs) with two parabasal spines (Pb-s), outer one nearly twice length of inner one (former foreshortened in figure); claspette with spines of ventral lobe (V-L) not much longer than club of dorsal lobe (D-L); processes of 9th tergite (P-IXT) shorter than interval between them.

Habits. A forest and heavy jungle species. Bites man fiercely and will enter houses. Several closely related species occur in Malaya.



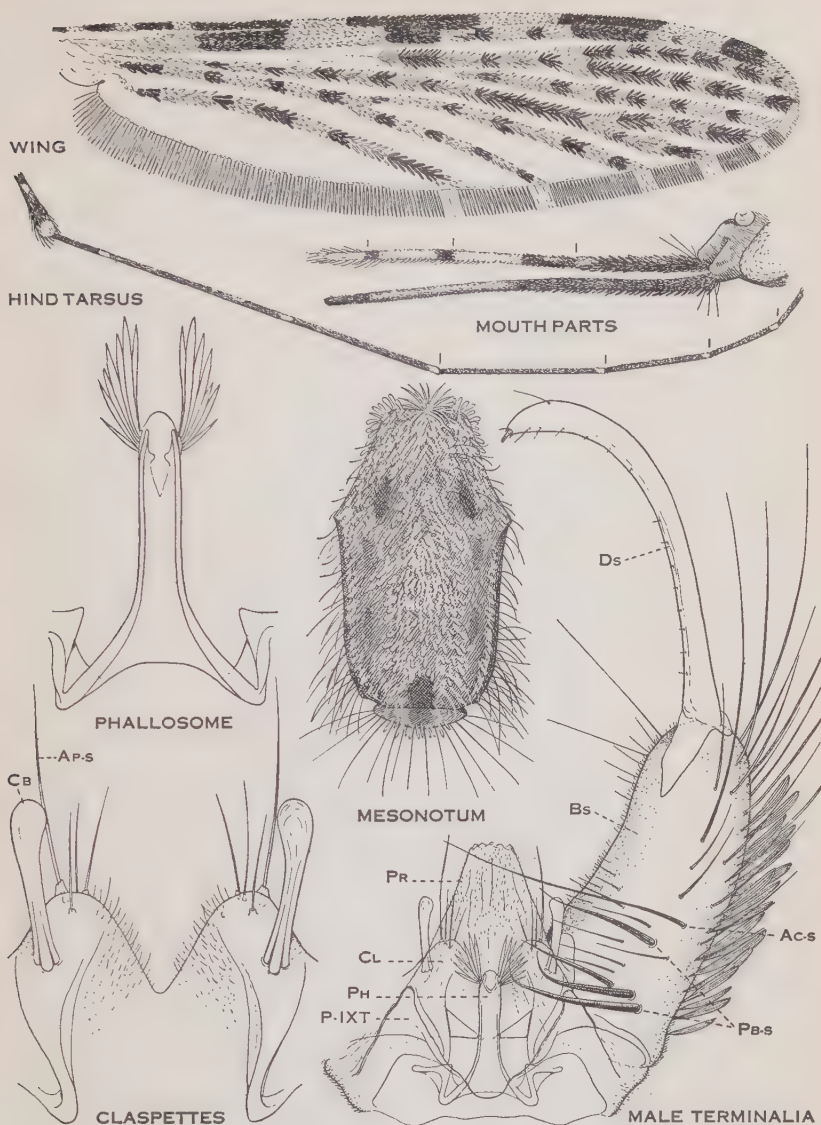
ANOPHELES (ANOPHELES) UMBROSUS Theobald, 1903

Identification. HEAD: inner clypeals (2) simple with their bases closely approximated; outer clypeals (3) with 5 to 10 branches; antennal hair (11) with 9 to 12 branches and arising from basal quarter of antenna. ABDOMEN: all palmate hairs (1) with "leaflets" hair-like, not flattened; hair 0 well developed on segments II to VII.

Habitat. Forest in stagnant pools, morasses, and collections of water between roots of trees. Occurs also in brackish water, and recorded from mountain brooks and springs.

Distribution. Widespread in the Oriental Region from Indo-China and the Celebes to eastern India. Not recorded from China and Japan. A very closely related species is found in the Philippines (*A. gateri* Baisas). Type locality: Pekan, Pabang, Malaya.

Illustrated specimens from (adults) Malay States; (larva) Kuala Lumpur, Malay States,



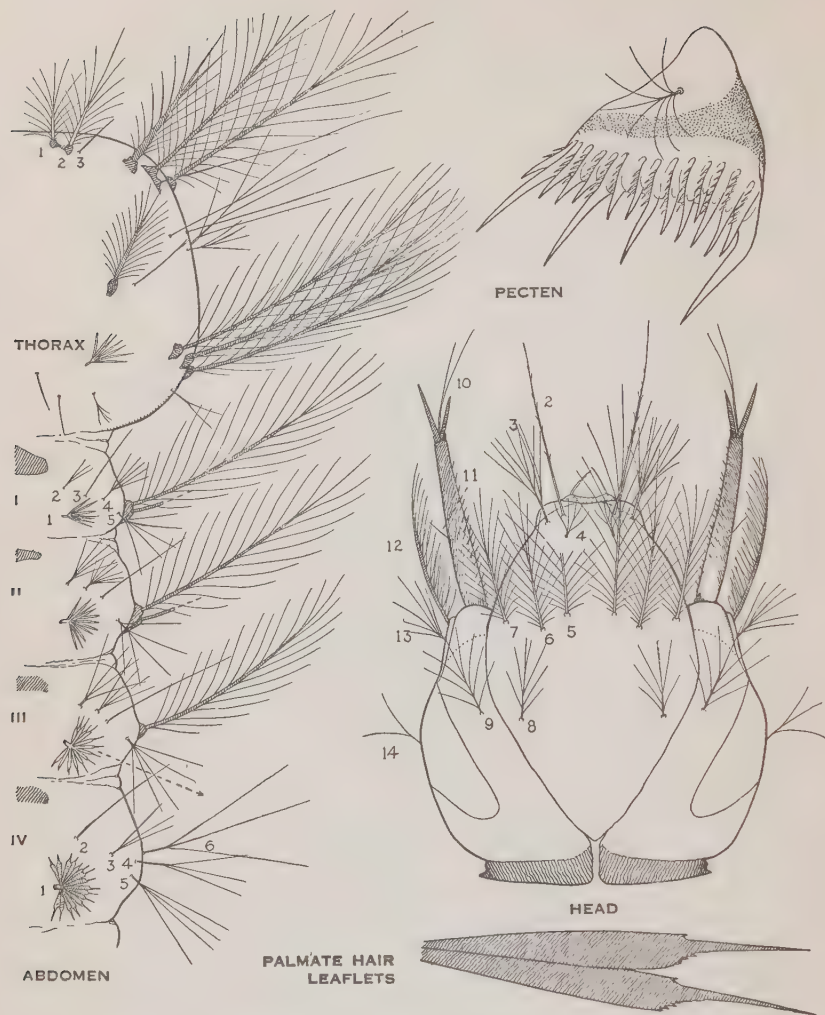
ANOPHELES (MYZOMYIA) ANNULIPES Walker, 1856

A presumed vector of malaria on epidemiological grounds.

Identification. ADULT FEMALE: Generally similar to *A. punctulatus*. Best distinguished by palpus having apical three segments broadly banded with white, proximal white band (on median segment) as broad, or broader, than others and not interrupted by any dark scales or bands. Abdominal tergites with at most scattered creamy scales, increasing posteriorly; sternites bare. MALE TERMINALIA: little to distinguish it from other related species. As in other members of the Group *Neomyzomyia*, 1 parabasal spine (PB-s) is widely spaced distad from the proximal three.

Habits. Enters houses and bites man readily.

Note. The above plate is based on specimens of what is regarded as the subspecies *A. annulipes mastersi* Skuse, 1888, the adult female of which is recognized by the pale apical half of the proboscis, as shown above, in contrast to the entirely dark proboscis of *A. annulipes annulipes*.



ANOPHELES (MYZOMYIA) ANNULIPES Walker, 1856

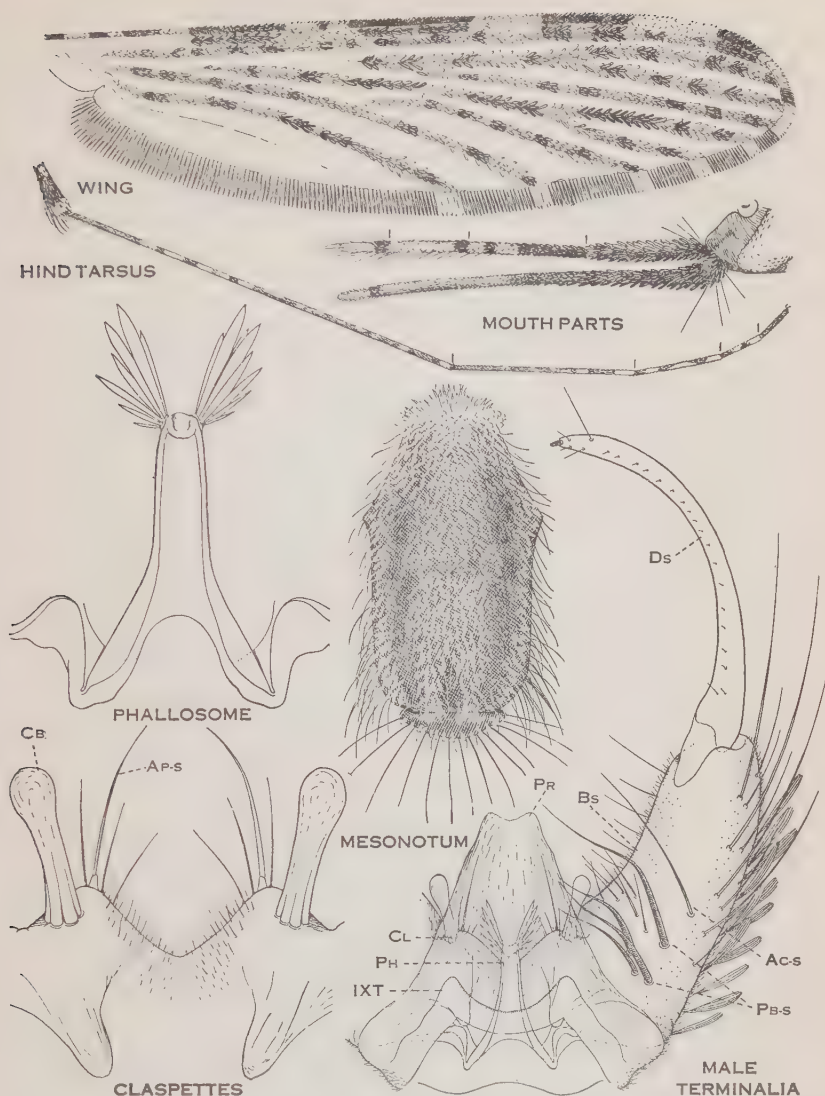
Identification. HEAD: inner clypeals (2) simple with their bases widely separated; outer clypeals (3) many-branched, more than one-half length of inner clypeals [usually plumose, see note below]; posterior clypeals (4) and inner suturals (8) about 5-branched. ABDOMEN: palmate hair (1) leaflets not prominently toothed before attenuate apical portion.

Habitat. Shallow grassy pools, edges of marshes, slow running creeks, surface wells, rock pools, and occasionally in brackish water.

Distribution. Tasmania; Australia, dry inland districts to an elevation of 5,000 feet, and coastal areas; Port Moresby, New Guinea. Type locality: Van Dieman's Land [Tasmania].

Illustrated specimens from (adults) Queensland, (larva) Brisbane, Queensland, Australia.

Note. *A. annulipes* is usually described as having outer clypeal hairs plumose, *i.e.* branched from a central shaft, rather than branched as shown above. The form illustrated may represent an undescribed subspecies of *A. annulipes*. Larvae from Port Moresby, New Guinea, are similar, but with branched outer clypeals shorter.



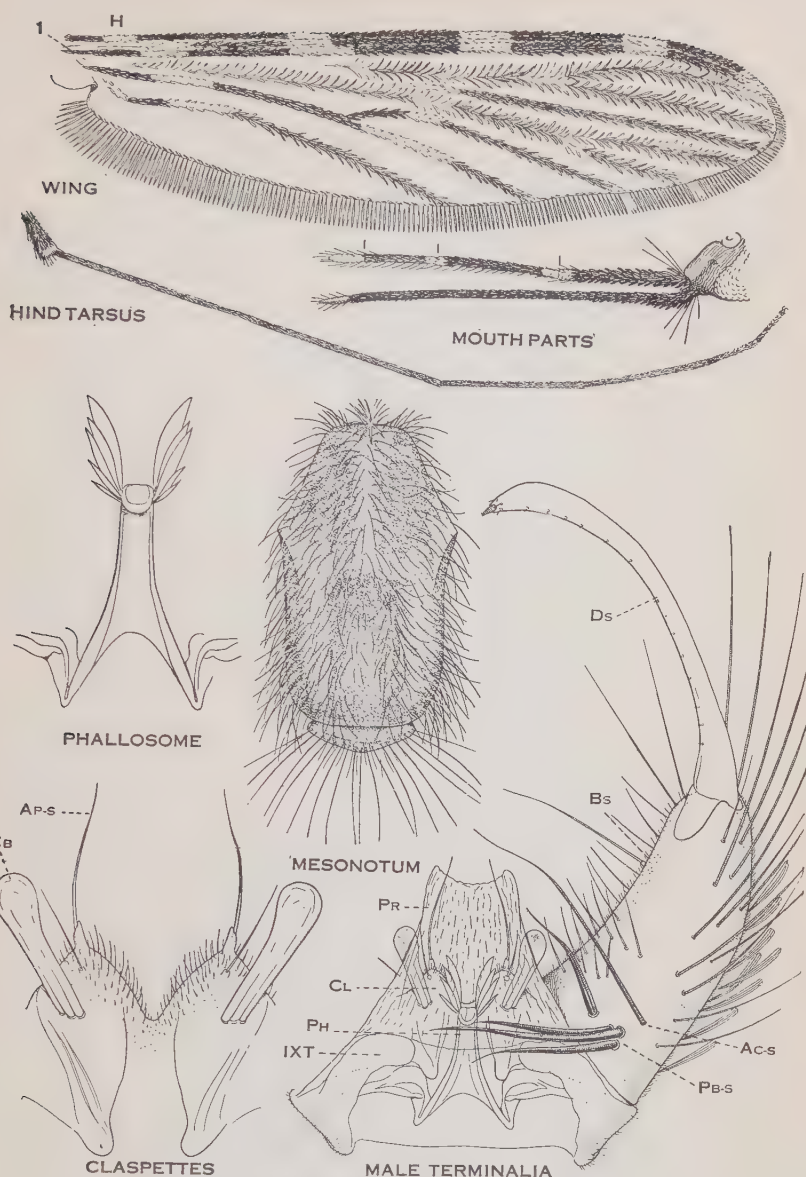
ANOPHELES (MYZOMYIA) PUNCTULATUS Dönitz, 1901

The important vector of malaria in the Australian Region, especially New Guinea. The subspecies *A. punctulatus moluccensis* is a vector of filariasis.

Identification. ADULT FEMALE: Palpus with white portion of median segment interrupted by black spot or narrow band forming two rather narrow white bands. Abdominal tergites with few if any scales. MALE TERMINALIA: of little use in distinguishing it from other related species (see under *A. annulipes*, p. 9).

Habits. Readily enters houses and tents in most areas. A weak flyer, usually not dispersing more than $\frac{1}{4}$ of a mile.

Note. Females with the pale apical portion of the proboscis, as illustrated above, represent the subspecies *A. punctulatus punctulatus*; those with the entirely dark proboscis represent *A. punctulatus moluccensis* Swell. and Swell.

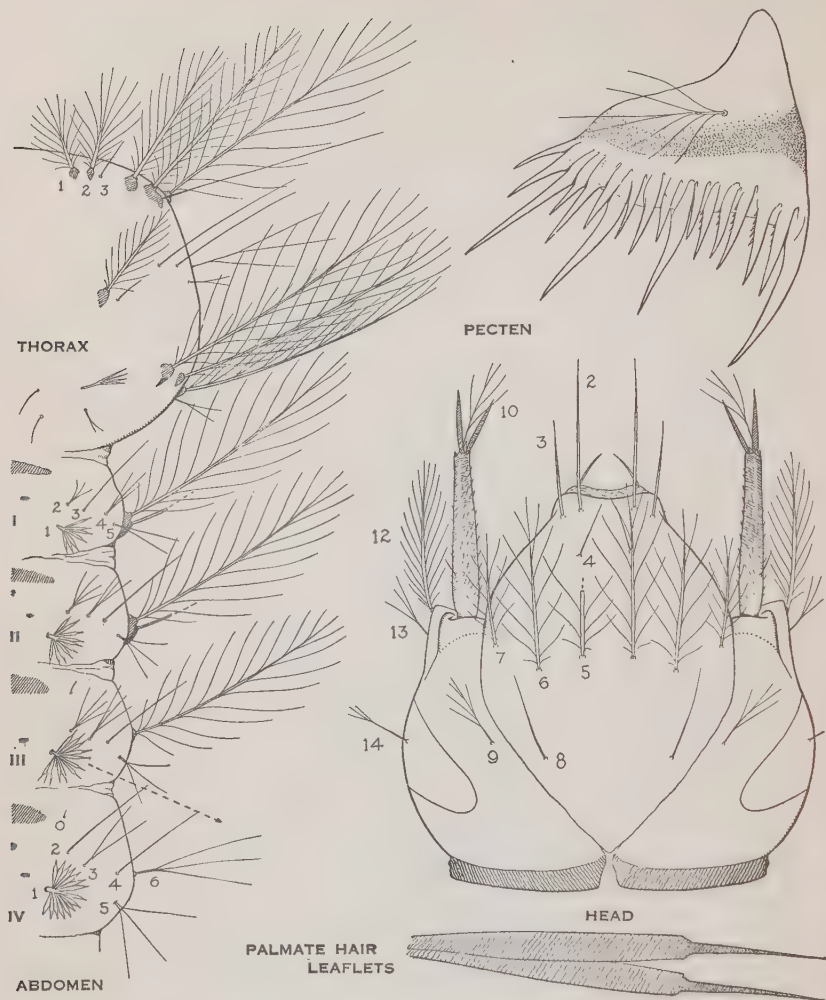


ANOPHELES (MYZOMYIA) CULICIFACIES Giles, 1901

The most important vector of malaria in India and probably the only one in Ceylon.

Identification. ADULT FEMALE: Proboscis with three whitish rings, the sub-apical one narrower than the more apical black band. Mesonotum lacking scales except for few weakly developed ones on anterior end; integument pale, concolorous. Wing with vein 1 black opposite humeral white spot (H) at base of costa; fringe with no more than 2 weakly developed pale spots. MALE TERMINALIA: parabasal spines (PB-s) closely clustered together; claspettes with apical spine (AP-s) but little longer than club (Cb); a single short accessory hair present; phallosome with 5 or more weakly serrate leaflets.

Habits. Bites man, but prefers cattle. Rests in buildings by day.



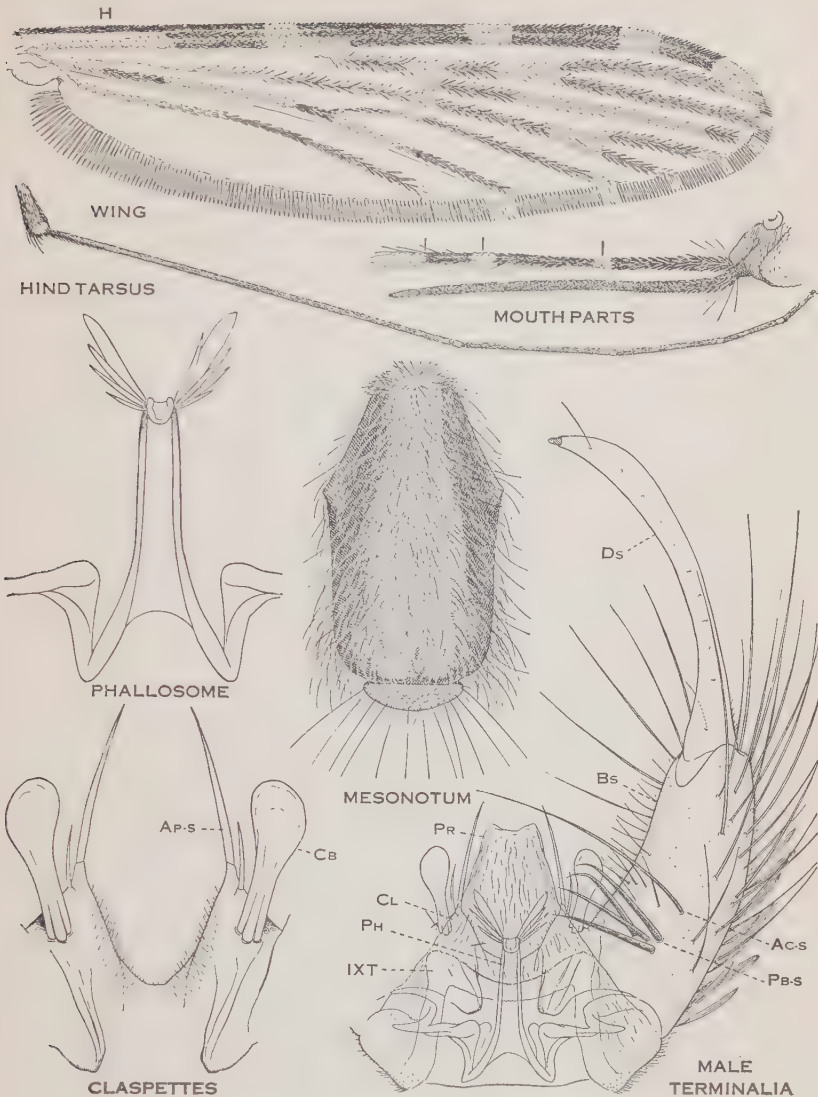
ANOPHELES (MYZOMYIA) CULICIFACIES Giles, 1901

Identification. HEAD: clypeal hairs (2-4) simple, inner clypeals (2) widely separated, outer clypeals (3) decidedly longer than posterior clypeals (4). ABDOMEN: palmate hairs (1) developed on segments I to VII, that on segment I not so well developed; leaflets long and slender with apical filament at least half length of main shaft.

Habitat. Occurs in fresh, clean water in irrigation ditches, pools of all sorts, slow moving streams, and wells. Recorded from brackish water. Most prevalent in northern India from May to November, winters as larva.

Distribution. India from Baluchistan to Burma and southward through Ceylon. * Also reported from Siam, Tonkin, and South Arabia. Ordinarily a plains species, but recorded at elevations of 6,000 feet or more. Type locality: Hoshangabad, Central Provinces, and the Berars, [Deccan], India.

Illustrated specimens from (adult female) Pattukkottai, South India; (adult male) Punjab, India; (larva except pecten) Karnal, India; (pecten) India (?).



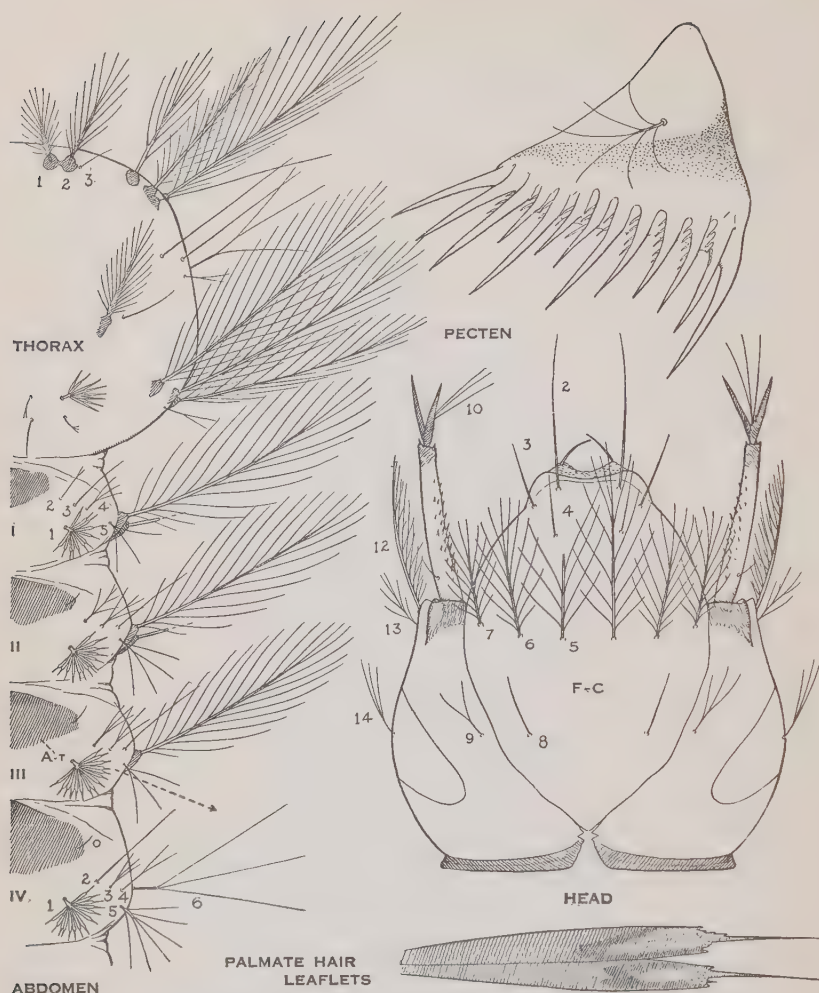
ANOPHELES (MYZOMYIA) FUNESTUS Giles, 1900

An important vector of malaria wherever it occurs. Also an important vector of filariasis.

Identification. ADULT FEMALE: Palpus with 3 pale bands, the apical and sub-apical ones narrower than intervening black portion. Mesonotum with long narrow scales. Legs entirely dark, except at times the apices of tarsal segments have pale scales. Wing variable in intensification of black and white areas. Humeral white spot (H) of costa present or absent. MALE TERMINALIA: phallosome with 5 or more pairs of leaflets; claspettes with apical spine (Ap-s) but little longer than club (Cb).

Habits. Occurs abundantly in houses and prefers human hosts to cattle and other animals. Effective flight range less than a mile.

Note. Several "varieties" or subspecies of *funestus* have been described, but they are relatively rare and limited in distribution.



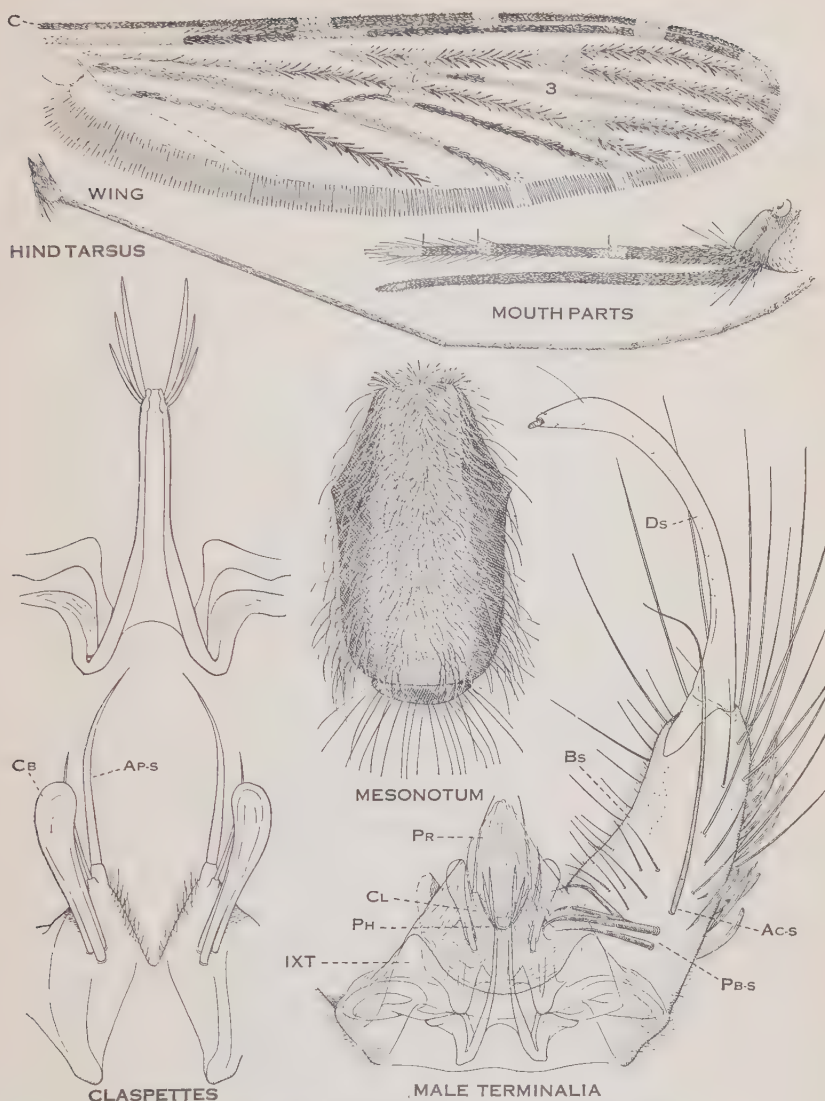
ANOPHELES (MYZOMYIA) FUNESTUS Giles, 1900

Identification. HEAD: clypeal hairs (2-4) simple, inner clypeals widely separated; dark pattern on anterior portion of fronto-clypeus (F-C), if well developed, forms a transverse band, never 2 longitudinal bands as in *A. leesonii*; inner sutural hairs simple or bifid. THORAX: prothoracic hairs 1 and 2 arising from a common, sclerotized base. ABDOMEN: anterior tergal plates (A-T) very large and include posterior tergal plates, and hair 0 on segments II to VII; ventral surface of abdominal segments with conspicuous rows of spicules.

Habitat. Breeds characteristically in bodies of clear water, either large or more or less permanent, usually among weedy vegetation and often in partial shade. Larvae when disturbed will dive and remain away from surface for an unusually long time.

Distribution. Widespread though sporadically distributed in tropical Africa. Recorded from Madagascar and Mauritius. Type locality: Freetown, South Africa.

Illustrated specimens from (adult female) Fanti, Gold Coast; (adult male) Gbanga, Liberia; (larva, except pecten) Mauritius; (pecten) Sierra Leone.



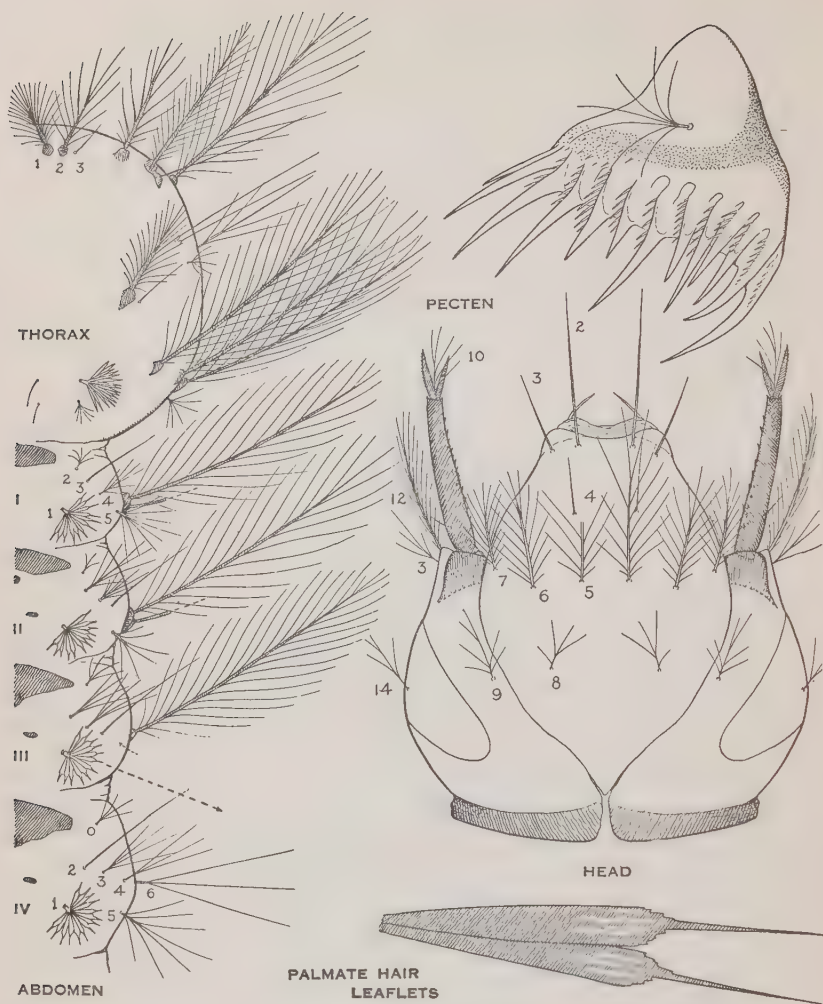
ANOPHELES (MYZOMYIA) FLUVIATILIS James, 1902

An important vector of malaria.

Identification. ADULT FEMALE: Palpus with subapical pale band decidedly narrower than apical one; intervening black band as broad or broader than apical pale band. Wing with proximal portion of costa (C) entirely dark; otherwise similar to *A. minimus*, which also has fringe spots at all veins but vein 6, and vein 3 extensively white. Mesonotum with median portion pale, and largely clothed with erect golden hairs. MALE TERMINALIA: claspette with apical spine (AP-S) large, stout, somewhat longer than club (CB), with a spine about $\frac{2}{3}$ its length between it and club. Phallosome with 3 pairs of serrate leaflets and sometimes an additional small pair of spicules.

Habits. Occurs commonly in houses and cowsheds and readily bites man.

Note. This species is a member of the *funestus-minimus* subgroup and most similar to *A. lesoni* and *A. funestus* of Africa. **SYNONYM.** *A. listoni* Liston.



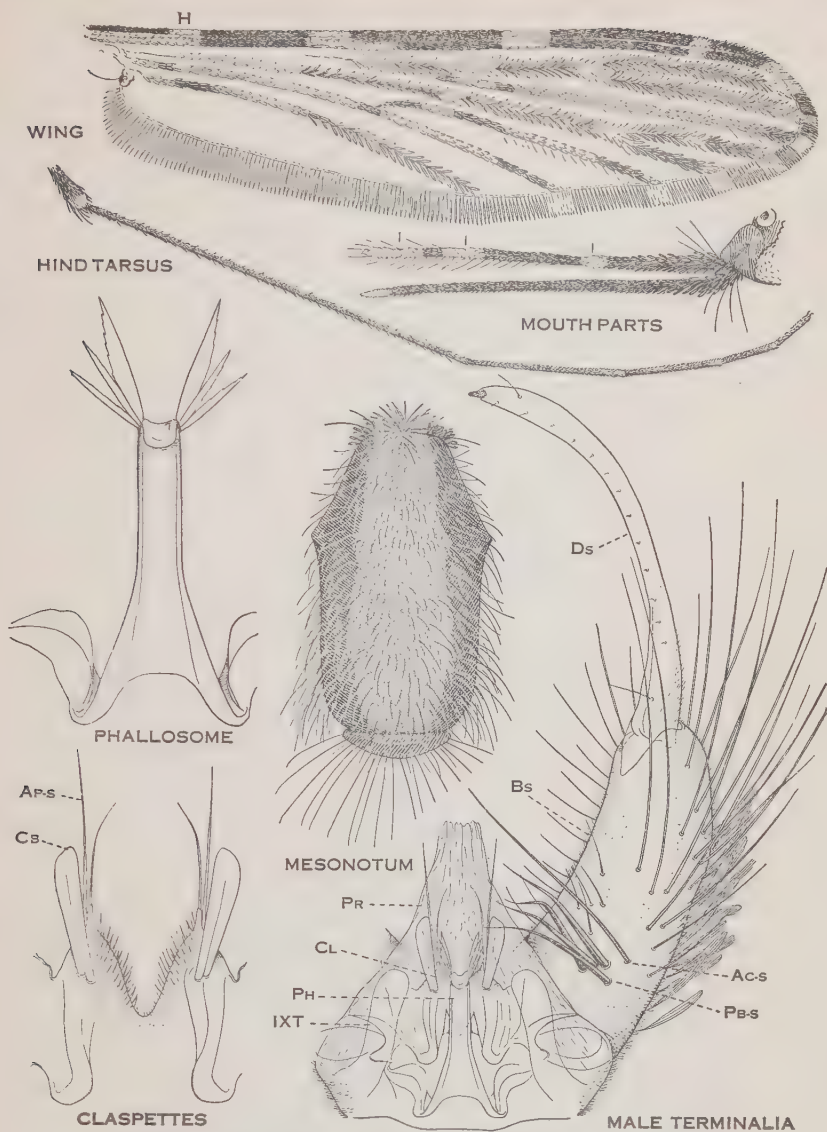
ANOPHELES (MYZOMYIA) FLUVIATILIS James, 1902

Identification. No satisfactory features have been found to separate this larva from *A. minimus*. See description under larva of that species. It is a member of the *funestus-minimus* subgroup of species which is recognized by the very large tergal plates of the abdomen. *A. minimus* and *A. fluviatilis* are separated from the other species, with the exception of *A. lesoni* which occurs only in south-eastern Africa, by both the clypeal hairs (2-4) being simple and hair 0 not arising from the tergal plates.

Habitat. Found at edges of foothill streams and in stream pools, springs, and irrigation channels; sometimes at edges of swamps, lakes, and tanks.

Distribution. Recorded outside Indian area only from Thailand; Tonkin, and Turkestan. Type locality: Duars, Nagpur, and Jeypore Hill Tracts, India.

Illustrated specimens from (adults) Amritsar, India; (larva) Sabzab, Persia.



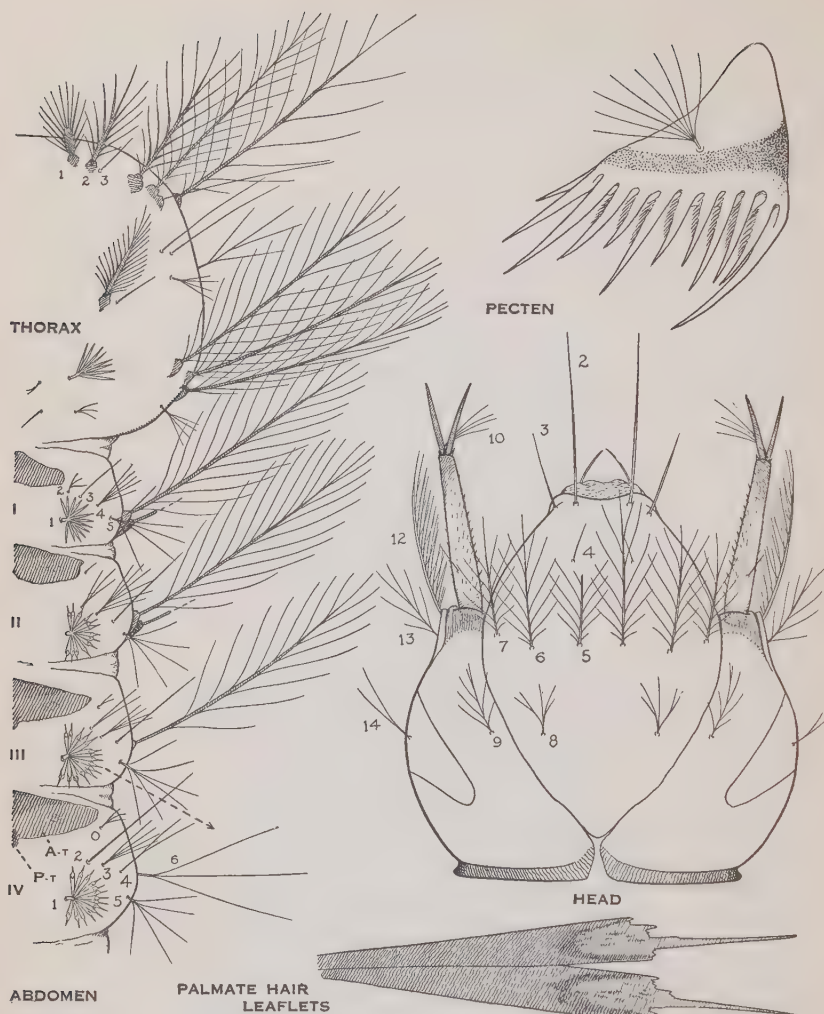
ANOPHELES (MYZOMYIA) MINIMUS Theobald, 1901

A most important malaria vector wherever it occurs; also a vector of filariasis.

Identification. ADULT FEMALE: Palpus with three white bands, the apical two both broader than intervening black band. Proboscis at times pale on apical half. Mesonotum with broad, pale median stripe; scales limited to anterior end. Costa with humeral spot (H) present but may be very small; wing fringe with pale spot at vein 6 usually absent. Hind tarsus dark. MALE TERMINALIA: claspette with long apical spine (AP-S); accessory spine dorsal to it and about two-thirds its length. Phallosome with 3 pairs of leaflets, occasionally an additional small pair.

Habits. Readily attacks man and cattle and is found abundantly in houses and cattle sheds. Said not to remain in buildings in the Philippines.

Note. In the Philippines it is believed that this species is represented by a subspecies, *A. minimus flavivittatus*. *A. aconitus*, an important malaria vector, is distinguished chiefly by clypeal hairs (2, 3) of larva having minute lateral branches.



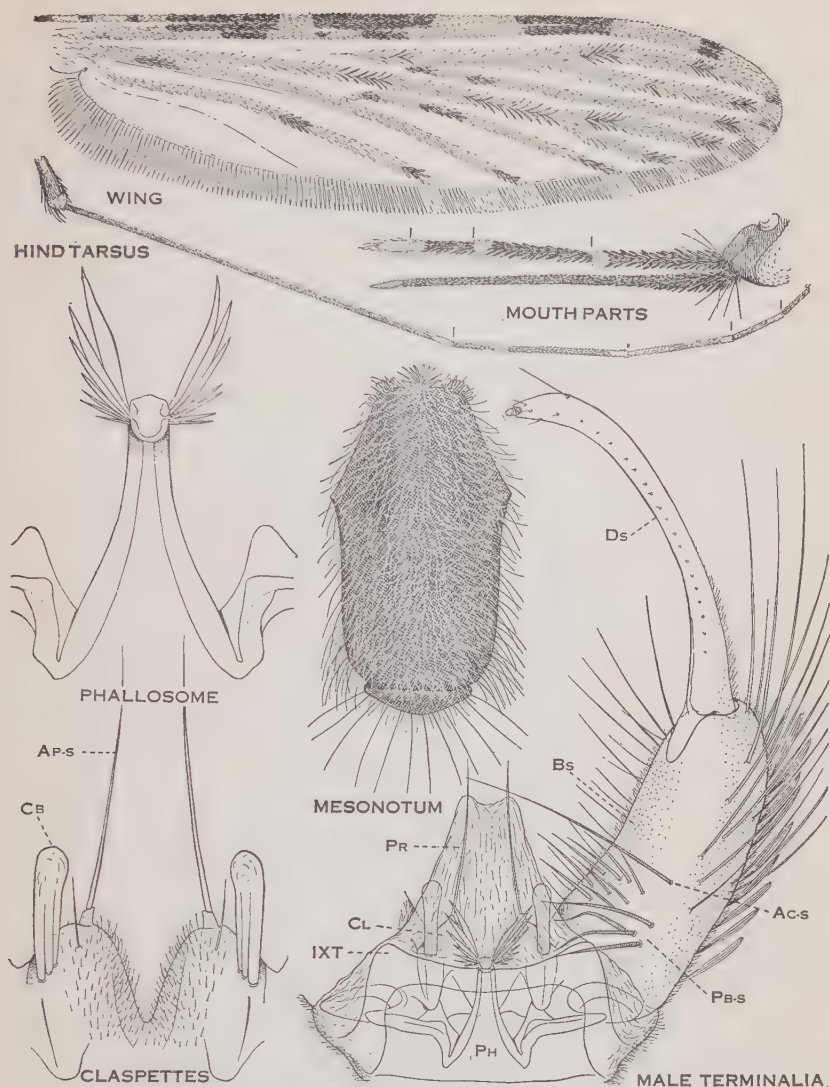
ANOPHELES (MYZOMYIA) MINIMUS Theobald, 1901

Identification. See remarks under larva of *A. fluviatilis* (p. 18). **HEAD:** clypeal hairs (2-4) simple; occipital hairs (8, 9) branched. **THORAX:** prothoracic submedian hairs 1 and 2 with heavy shafts, not arising from a common sclerotized base. **ABDOMEN:** tergal plates very large, though not including hair 0; the small, round posterior tergal plate (P-T) fused with the anterior tergal plate (A-T) on segments III to VII; palmate hairs (1) developed on segment I to VII, those on segments II to VII with their leaflets distinctly pigmented apically.

Habitat. Most commonly found along the grassy edges of clear, sunlit, slowly flowing streams and springs. Less frequently on margins of swamps, irrigation ditches, and rice fields. Usually associated with bamboo in Philippines. Does not occur in dense virgin jungle.

Distribution. Widely distributed throughout the Oriental Region; southern China, Philippines, Celebes, to India (eastern and southern) and Ceylon. Type locality: Hong Kong.

Illustrated specimens from (adults and larva except pecten) Hong Kong; (pecten) Tukong Manga, Bulacan, Luzon, Philippines.



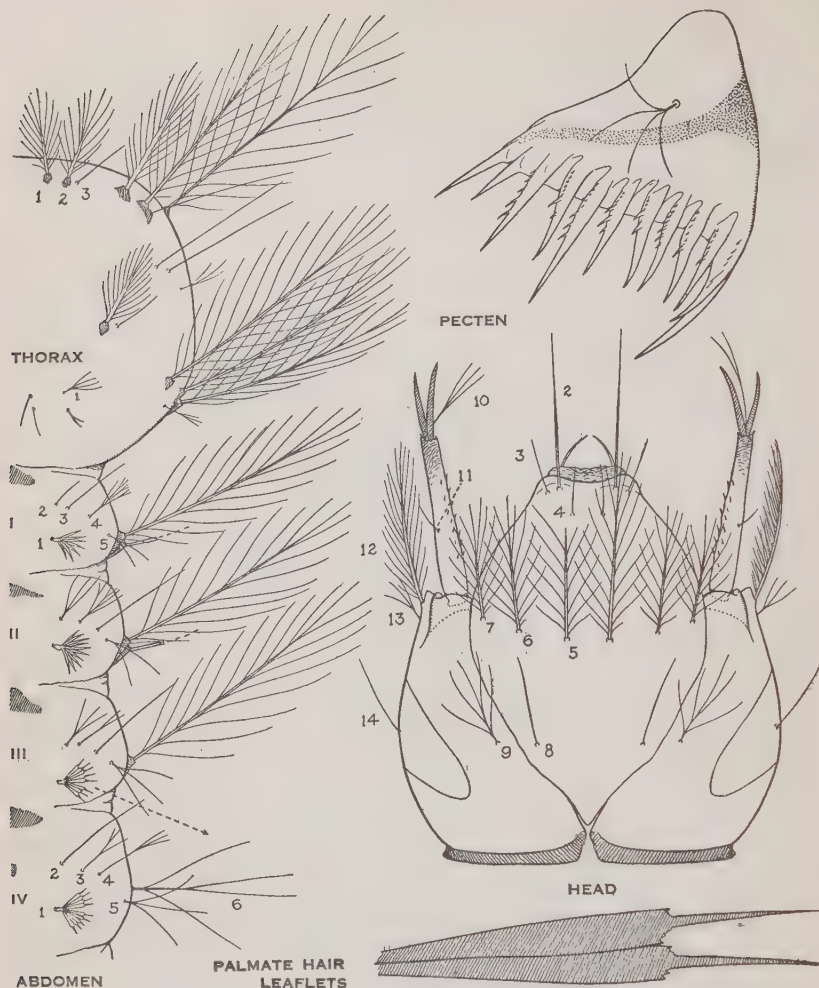
ANOPHELES (MYZOMYIA) SUBPICTUS Grassi, 1899

Believed of importance as a vector of malaria in Celebes, but not elsewhere.

Identification. Wing with black areas reduced in extent, but rather variable; costa with 4 or more pale spots; many pale fringe spots. Mesonotum with integument concolorous covered with pale golden hairs. This species and *A. vagus* are recognized by their unspeckled femora and tibiae and broad whitish bands on front tibiae (not illustrated). Distinguished from *A. vagus* by palpus with preapical dark band at least half length of apical pale band. MALE TERMINALIA: claspettes with apical spine (AP-S) twice length of club (CB); phallosome with 6 or more leaflets. Males quite similar to *A. vagus*; including terminalia.

Habits. Often present in large numbers in houses and cowsheds. Feeds on man and animals; most frequently on cattle.

Note. *A. subpictus subpictus* (here illustrated) distinguished from other subspecies by relatively shorter preapical dark band of palpus.



ANOPHELES (MYZOMYIA) SUBPICTUS Grassi, 1899

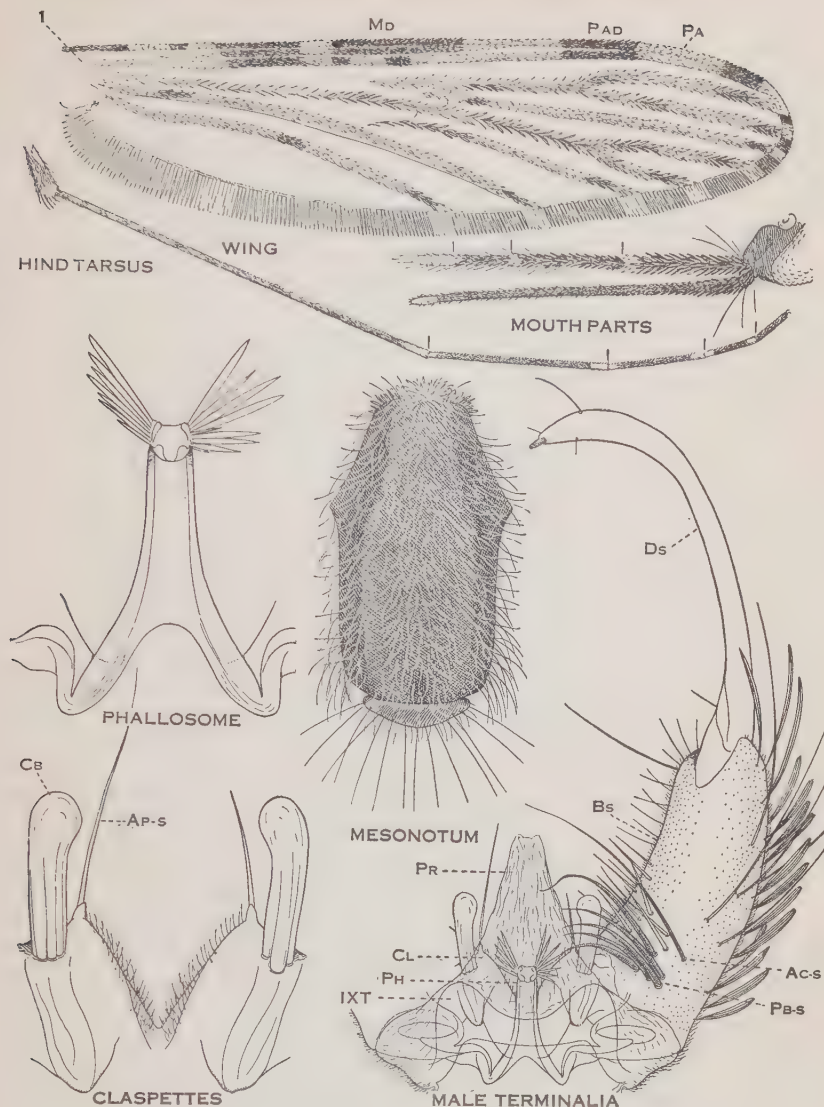
Identification. HEAD: clypeal hairs (2-4) simple; inner clypeals (2) widely separated; outer (3) and posterior (4) clypeals at least $\frac{1}{2}$ length of inner clypeals (2). THORAX: prothoracic hairs 1 to 3 without conspicuous sclerotized bases; metathoracic hair 1 hair-like, without flattened leaflets. ABDOMEN: palmate hair (1) of segment I weakly developed.

Habitat. Breeds especially in small pools, and puddles often of a temporary nature. Also in artificial containers such as rain gutters. In Netherlands Indies said to be a coastal species, often in brackish water.

Distribution. India, Ceylon through Indo-China, Netherlands Indies to New Guinea. Type locality: Calcutta, India.

Illustrated specimens from (adults) Amballa, India; (larva, except pecten) Calcutta, India; (pecten) Suan Sanuke, Bangkok, Siam.

Note. The larva of *A. sundaicus* is very similar but distinguished by setae on dorso-caudal end of anal segment coarser and somewhat pigmented. *A. vagus* is distinguished by its much shorter outer (3) and posterior (4) clypeal hairs. Sub-species of *A. subpictus* are not clearly distinguishable in larval stage.



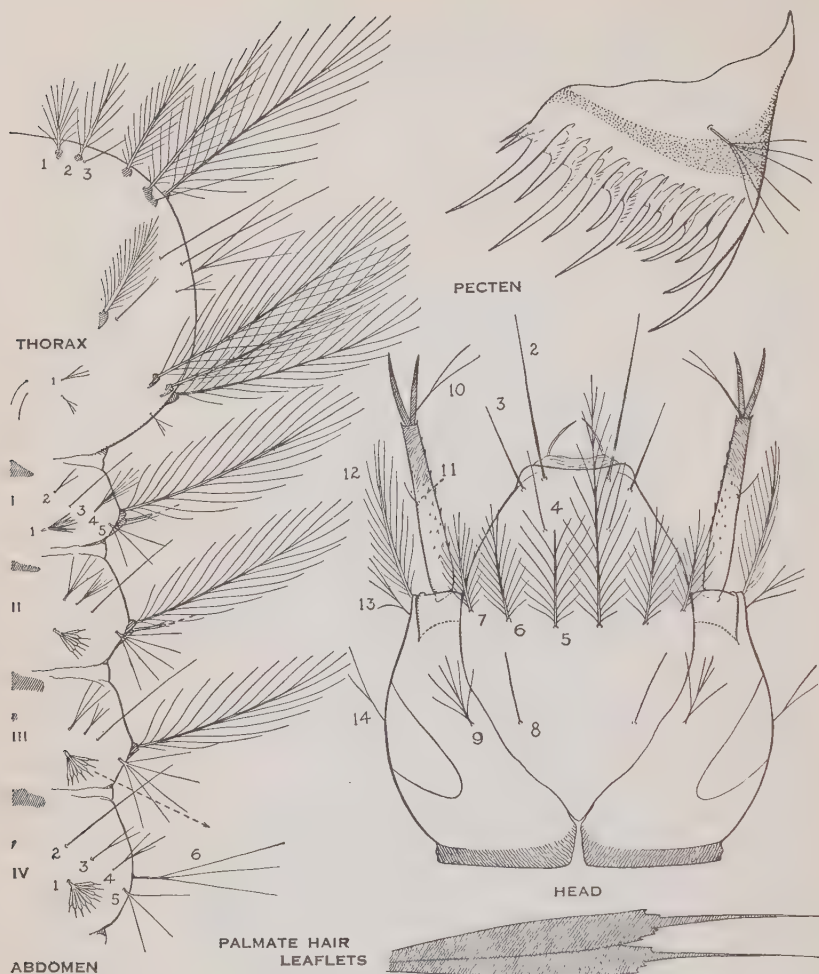
ANOPHELES (MYZOMYIA) SUNDAICUS (Rodenwaldt), 1926

An important vector of malaria in Bengal, Malaya, Indo-China, and Netherlands Indies. Also a vector of filariasis.

Identification. ADULT FEMALE: Palpus with 3 whitish bands; apical band about same length as subapical dark band. Legs speckled (must not be confused with rubbed legs of unspeckled species, *i.e.*, *A. subpictus*, *A. vagus*). Wing with preapical white spot (PA) decidedly shorter than preapical dark area (PAD). MALE TERMINALIA: very similar to *A. subpictus*.

Habits. A coastal species, found abundantly in houses and cowsheds. A strong flier.

Notes. *A. ludlowi* is a closely related species and differs chiefly from *A. sundaicus* by wing with 3 instead of 2 black spots on vein 1 below median dark area (Md) of costa.



ANOPHELES (MYZOMYIA) SUNDAICUS (Rodenwaldt), 1926

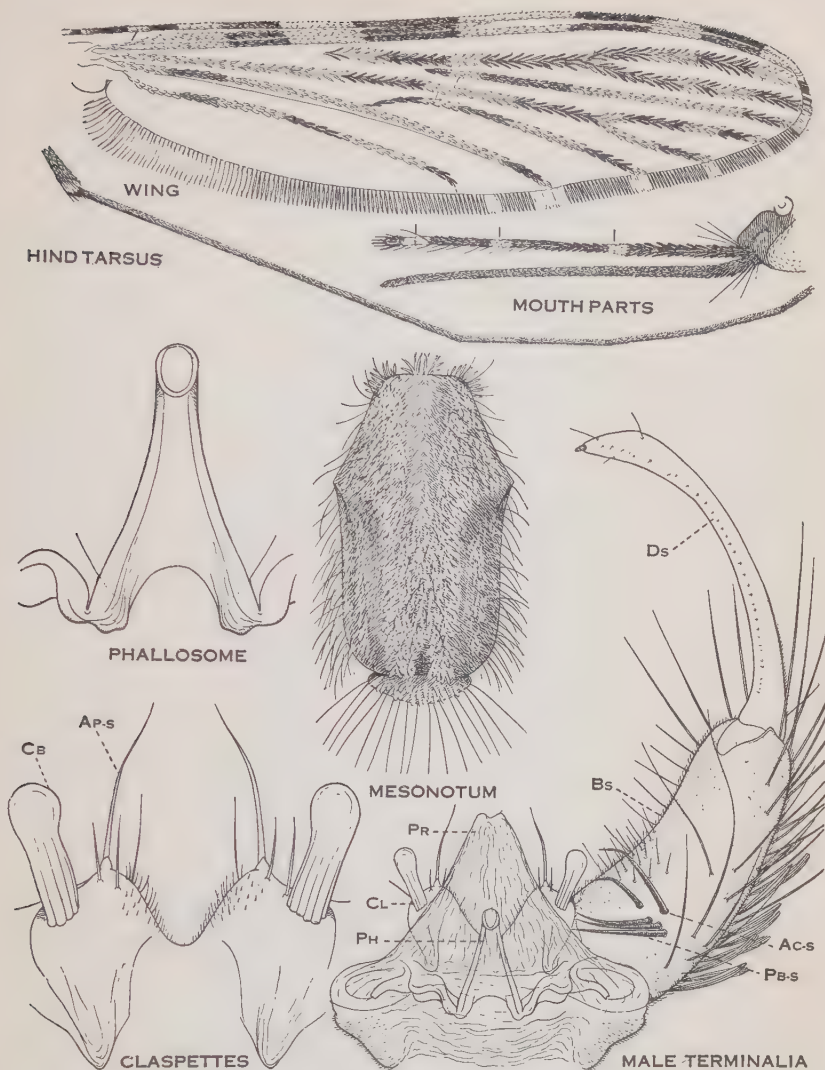
Identification. HEAD: clypeal hairs (2-4) simple; inner clypeals (2) widely separated; outer (3) and posterior (4) clypeals more than $\frac{1}{3}$ length of inner clypeals (2). THORAX: prothoracic hairs 1 to 3 without conspicuous sclerotized bases; metathoracic hair 1 without flattened leaflets. ABDOMEN: palmate hair (1) of segment I weakly developed, leaflets without distinct terminal filaments.

Habitat. Breeds pre-eminently in salt water swamps and collections of brackish water behind the shore line, among surface vegetation. In Netherlands Indies, especially associated with fish-ponds on the coast.

Distribution. Coastal areas of northeastern India, Burma, Andamans, Malaya, Siam, Netherlands Indies, and Borneo and possibly farther East. Type locality: Sunda Islands.

Illustrated specimens from (adult female) Mizi, Sarawak; (adult male) Singapore; (larva) Salt Lake, Calcutta, India.

Note. See comments under *A. subpictus* (p. 21). Very close to *A. ludlowi*, and its related salt water species *A. littoralis*. The latter species occurs only in the Philippines and possibly Formosa.

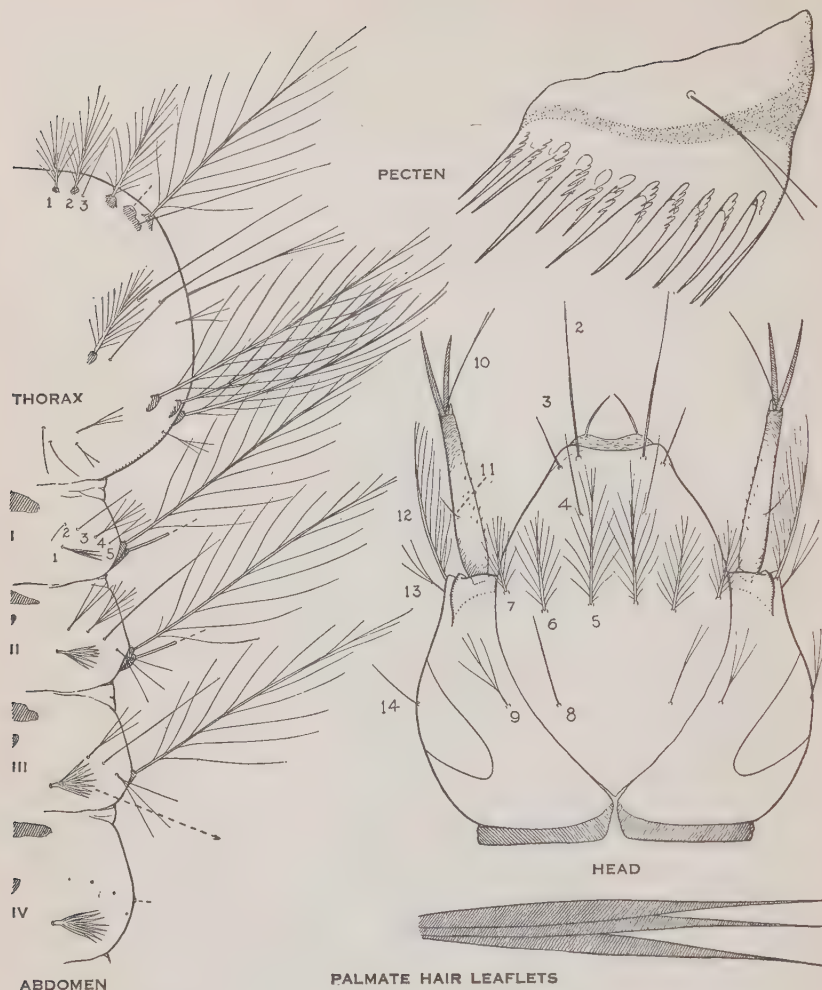


ANOPHELES (MYZOMYIA) MULTICOLOR Cambouliu, 1902

"Often responsible for intense malaria in neighborhood of oases" (P. A. Buxton).

Identification. ADULT FEMALE: Palpus with 3 narrow pale bands; end of apical segment dark with several stout bristles forming a brush-like tuft. Mesonotum pale, extensively covered with narrow, creamy scales. Wing markings rather variable; dark areas of costal region usually shorter than pale areas; those on wing field commonly reduced to small spots. Legs unspeckled; all tarsal segments lack distinct pale bands. MALE TERMINALIA: phallosome without leaflets, very broad at base; basistyle (Bs) with accessory spine (Ac-s) not markedly longer than the four parabasal spines (PB-s). Claspettes with club (CB) and apical spine (AP-s) short, several accessory hairs present.

Habits. Readily enters dwellings and bites by night.



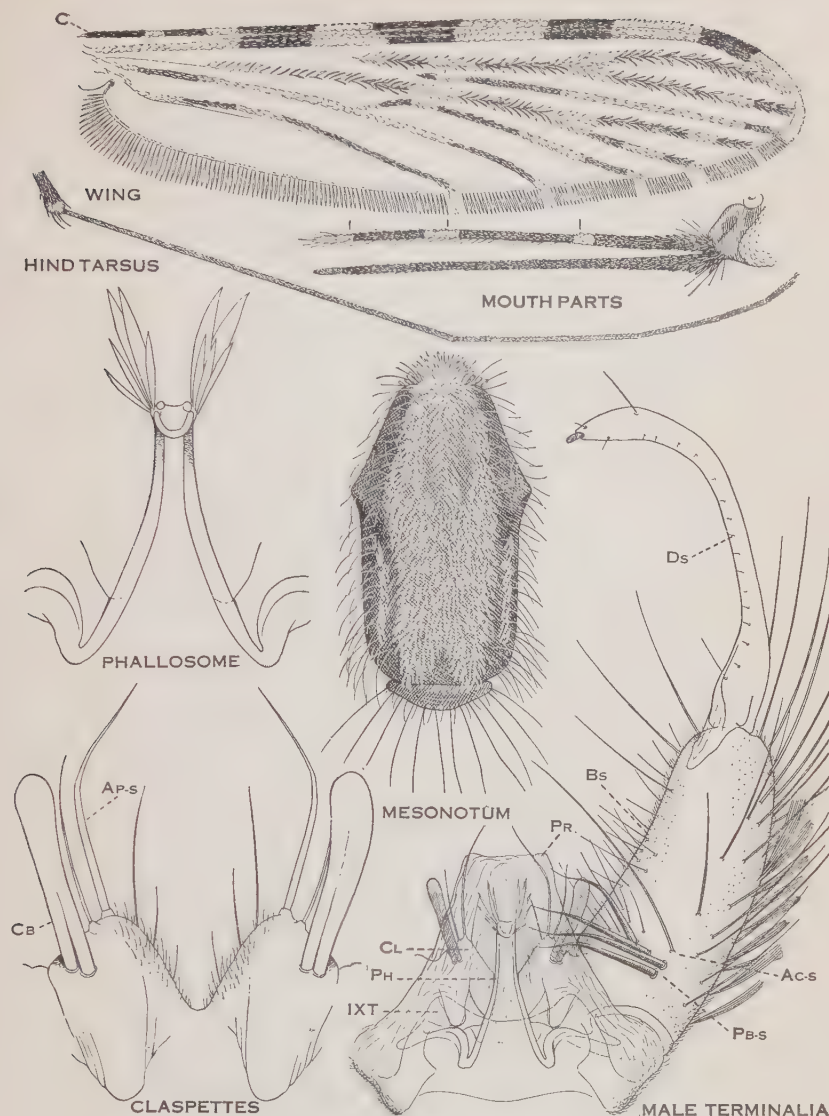
ANOPHELES (MYZOMYIA) MULTICOLOR, Cambouliu, 1902

Identification. HEAD: clypeal hairs (2-4) entirely simple; inner clypeals (2) widely separated; frontal hairs (5, 6) with at least some dark pigmentation around their bases. THORAX: metathoracic palmate hair (1) rudimentary, hair-like with a few simple branches. ABDOMEN: segment I with palmate hair (1) rudimentary, hair-like; other segments with palmate hairs (1) small, weakly developed, their leaflets with apical filaments poorly defined or undeveloped. To see the features that distinguish this larva from that of *A. superpictus*, good microscopic equipment is required.

Habitat. Small pools, stagnant and flowing drains; an important characteristic is its ability to breed in salt water, tolerating a salinity up to 5.96%.

Distribution. A desert species of North Africa, Cyprus, Palestine to eastern Iran, and Baluchistan. Type locality: Isthmus of Suez.

Illustrated specimens from (adults) Suez Canal; (larva) near Ismailia, Egypt (head outline reconstructed).

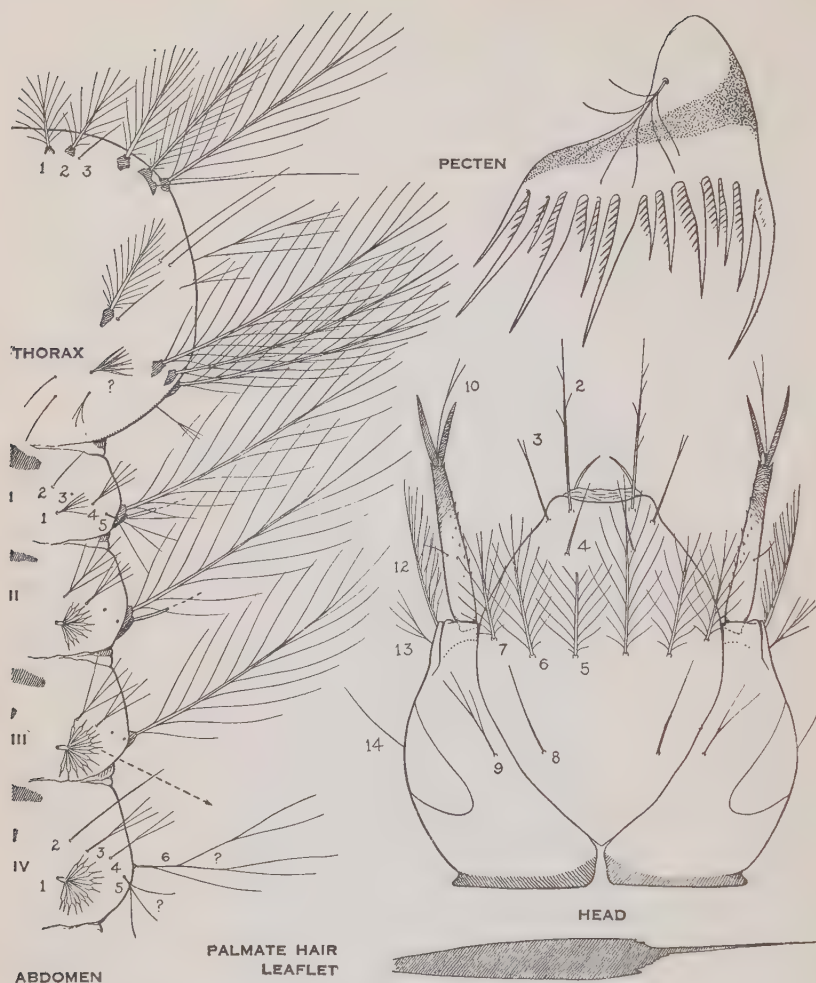


ANOPHELES (MYZOMYIA) SUPERPICTUS Grassi, 1899

A vector of malaria in southern Europe, Mesopotamia, and Baluchistan.

Identification. ADULT FEMALE: A large species for the subgenus *Myzomyia*. Palpus with three rather narrow, pale bands, apical one often divided by a median, dark ring. Mesonotum extensively covered with narrow pale scales. Wing with major white areas of costa (C) nearly same length as intervening black areas. Legs unspeckled; hind tarsi entirely dark, or sometimes with segments indistinctly pale at their apices. MALE TERMINALIA: claspets with apical spine (AP-S) somewhat longer than club (CB) and with two or more accessory hairs, phallosome with 5 or 6 leaflets; basistyle (BS) with four parabasal spines (PB-S) grouped together.

Habits. Often found resting in buildings or tents. Females found throughout winter months.



ANOPHELES (MYZOMYIA) SUPERPICTUS Grassi, 1899

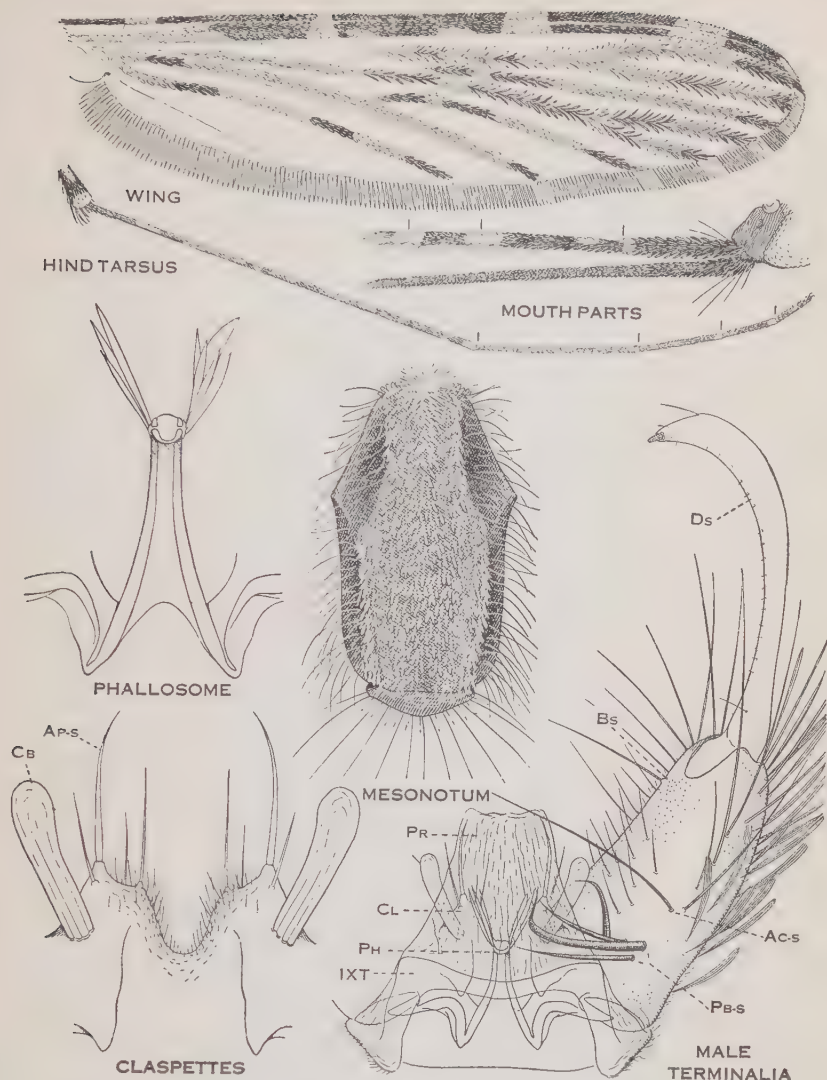
Identification. HEAD: inner clypeal hairs (2) widely separated and very faintly feathered (seen under high magnification only); outer clypeals (3) said to be simple or faintly feathered; posterior clypeals (4) simple. THORAX: metathoracic palmate hair (1) with poorly developed leaflets. ABDOMEN: segment I with "leaflets" of palmate hair (1) hair-like; segment II with palmate hair (1) well developed; palmate hair (1) leaflets of segment IV with apical filament about $\frac{2}{3}$ length of main shaft; lateral hair (6) of segment IV with about 5 branches.

Habitat. Usually occurs in hill or mountain country and found in pools, beds of small streams, rivers, and irrigation systems where there is flowing water.

Distribution. Southern Europe and Near East through Trans-Caucasia, Bokhara, Iran, and northwest India. Type locality: Italy.

Illustrated specimens from (male) Macedonia; (female) Struma, Macedonia; (larva) Tirana, Albania.

Note. Only available larva for drawing lacked certain hairs. Some of these are based on drawings of other authors and so indicated by a "?" mark, others indicated by the basal tubercle only.



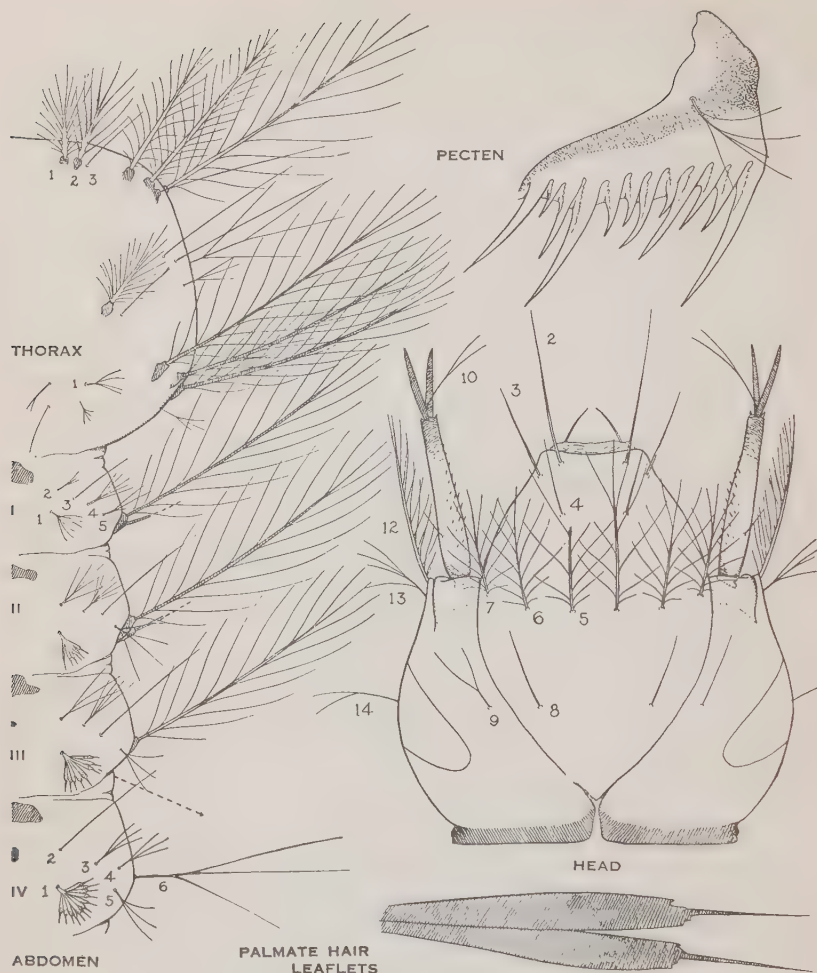
ANOPHELES (MYZOMYIA) STEPHENSI Liston, 1901

A most important vector of malaria.

Identification. ADULT FEMALE: Palpus with 2 broad apical pale bands (illustrated specimen from Basrah shows intervening dark band unusually broad and apical segment with a faint dark ring, not reported present in Indian specimens); white spot on dorsum of median segment commonly present. Mesonotum extensively covered with narrow, pale scales. Wing markings rather variable. Legs speckled; hind tarsi with narrow apical bands on segments I to IV, apical segment dark. MALE TERMINALIA: no marked features readily distinguish the terminalia. Parabasal spines (Pb-s) closely clumped together; accessory spine (Ac-s) well separated.

Habits. Commonly found in houses and cowsheds and readily bites man.

Note. *A. stephensi mysorensis* Sweet and Rao, 1937, found in same general area as *A. stephensi stephensi*, is only distinguished by average measurements of egg.



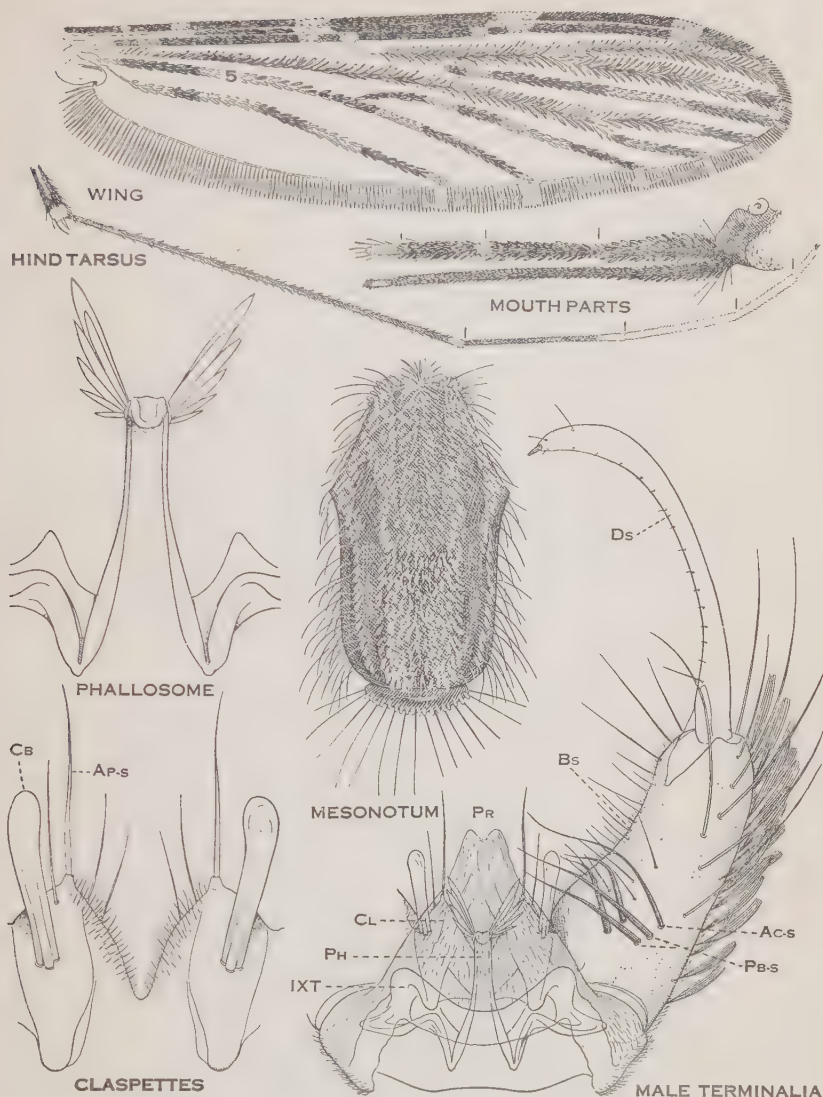
ANOPHELES (ANOPHELES) STEPHENSI Liston, 1901

Identification. HEAD: inner clypeal hairs (2) sometimes frayed, widely separated; outer clypeals (3) simple, about $\frac{2}{3}$ length of inner clypeals. THORAX: prothoracic hairs 1 and 2 with basal tubercles large but not fused together; hair 1 of metathorax very weakly developed. ABDOMEN: segment I with palmate hair (1) with "leaflets" hair-like, and hair 4 with 3 to 5 branches; segments II to VII with palmate hairs (1) well developed and the leaflet filaments not more than half length of main shaft.

Habitat. Under natural conditions, in pools of river and stream-beds, and in sluggish creeks. In urban areas adapted to wells, cisterns, fountains, flooded cellars and many types of artificial containers.

Distribution. India, Upper Burma to Rangoon, southern Irak, Iran, and eastern Arabia. Type locality: Ellichpur, Berars, Deccan, India.

Illustrated specimens from (adults) Basrah, Mesopotamia; (larva) Karnal, India (head outline reconstructed).



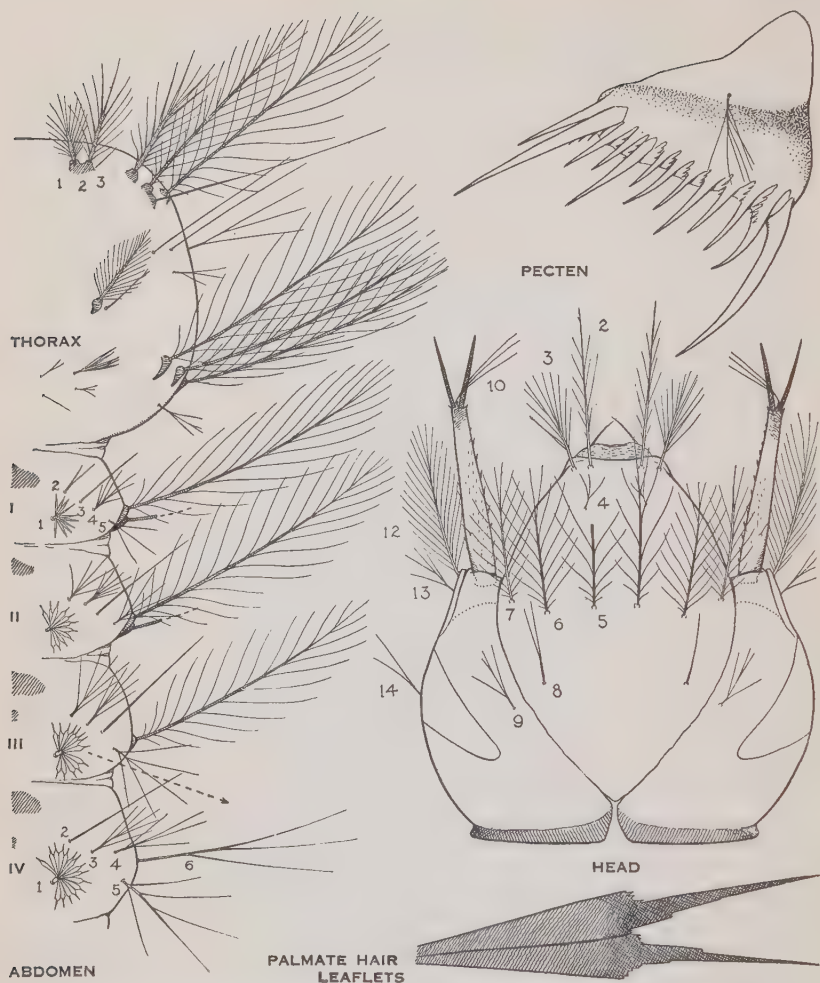
ANOPHELES (MYZOMYIA) ANNULARIS Van der Wulp, 1884

Has been found naturally infected, but its relative importance as a vector of malaria is not established.

Identification. ADULT FEMALE: Distinguished from other oriental species, except *A. schuffneri*, *pallidus*, and *philippinensis*, by general black coloration; last 3 segments of hind tarsi white (sometimes a dark band at base of segment 3); femora and tibiae unspeckled. Distinguished from above 3 species by vein 5 being either extensively dark or with at least a dark spot at origin of its branch. Second segment of hind tarsus with apical portion (about $\frac{1}{2}$ length of segment) white. MALE TERMINALIA: Claspettes with apical spine (AP-s) relatively short and with 2 or 3 accessory hairs mesad to it. Phallosome with about six leaflets. Basistyle (Bs) with parbasal spines (PB-s) rather short and clustered together.

Habits. Pre-eminently feeds on cattle and frequents cattle-sheds at least in Indian area. Known to enter houses and to bite man, however.

SYNONYM. *A. fuliginosus* Giles, 1900.



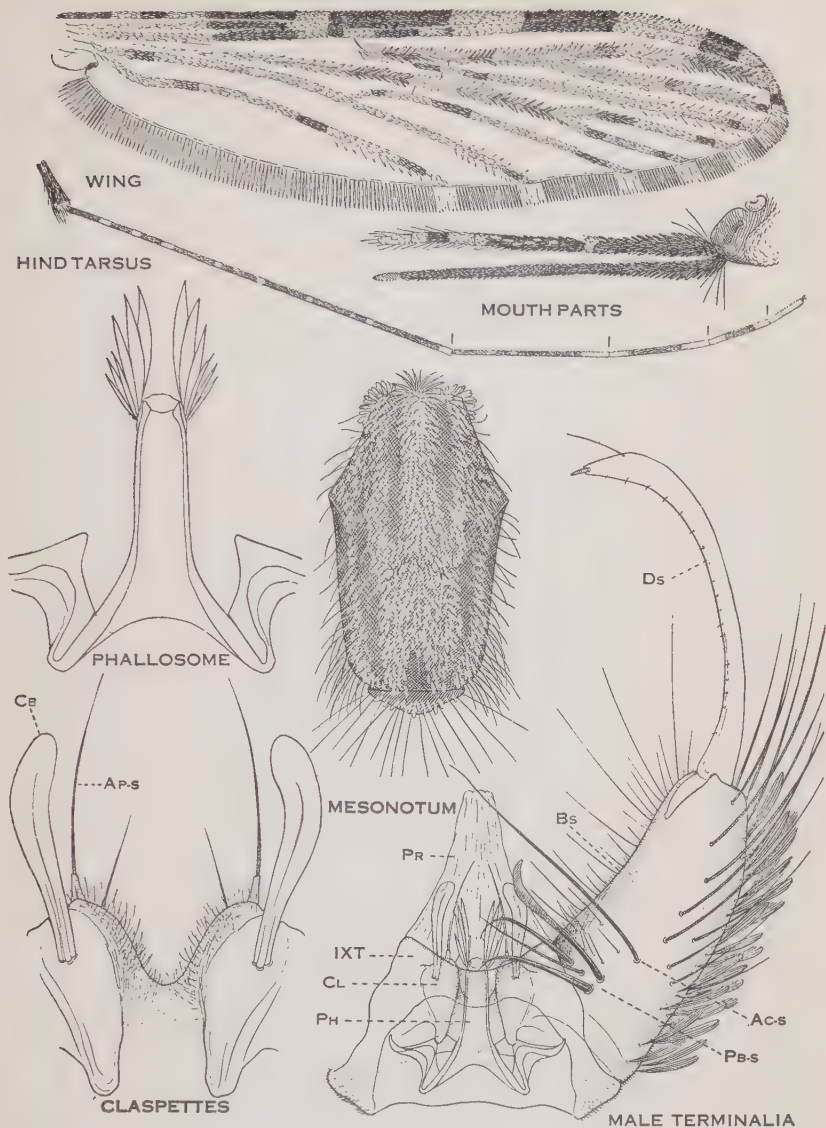
ANOPHELES (MYZOMYIA) ANNULARIS Van der Wulp, 1884

Identification. HEAD: inner clypeals (2) widely separated and with fine lateral branches; outer clypeals (3) heavily branched, main shaft usually undivided; posterior clypeals (4) 2- to 4-branched or single; inner suturals (8) single or bifid. THORAX: prothoracic hairs 1 to 3 arising from common, sclerotized tubercle. ABDOMEN: palmate hair (1) of segment I small, but with definite leaflets developed; other palmate hair leaflets with slender terminal filament about $\frac{3}{4}$ length of blade and the shoulders with well marked serrations.

Habitat. Usually found in large tanks or fresh water ponds with aquatic vegetation, in slowly flowing streams, rivers, ditches, or along shallow vegetated margins of lakes. May occur up to an elevation of 7,000 feet.

Distribution. Widespread throughout Oriental Region: South China, Formosa, Philippines, Borneo, Lesser Sunda Islands, Java, and westward through India and Ceylon.

Illustrated specimens from (adults) La Carlotta, Negros, Philippines; (larva) Tanque, Calauan, Laguna, Luzon, Philippines.

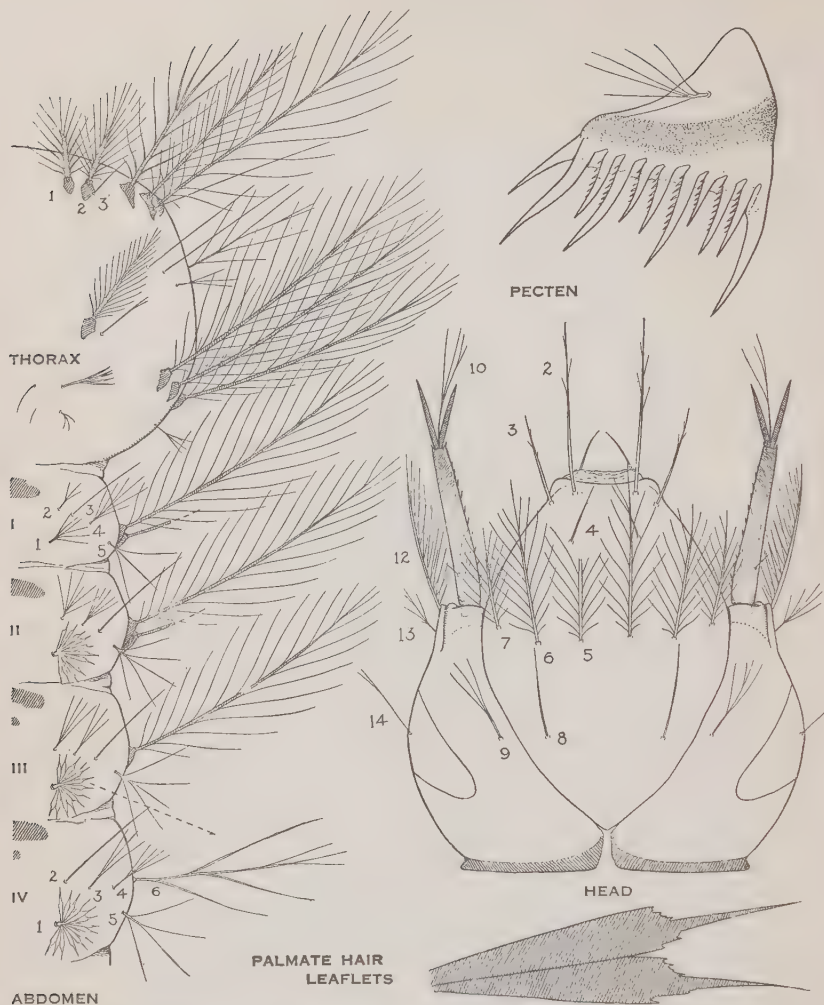


ANOPHELES (MYZOMYIA) MACULATUS Theobald, 1901

At least in Malaya and Netherlands Indies, regarded as a most important vector of malaria. Also a vector of filariasis.

Identification. ADULT FEMALE: Palpus with three pale bands and sometimes scattered white scales among the black. Mesonotum with broad creamy white scales. Wing vein 6 with 2 or 3 dark spots. Femora and tibiae speckled; hind tarsus with segments I and II white apically, segments III and IV white basally and apically, segment V white. Abdomen often with considerable scaling. MALE TERMINALIA: claspettes with apical spine (AP-s) but little longer than club (CB) and with one or two accessory hairs mesad to it; phallosome with 6 or 7 leaflets.

Habits. Feeds readily on humans as well as cattle. Probably enters houses only to feed, then departing. Attracted to light.



ANOPHELES (MYZOMYIA) MACULATUS Theobald, 1901

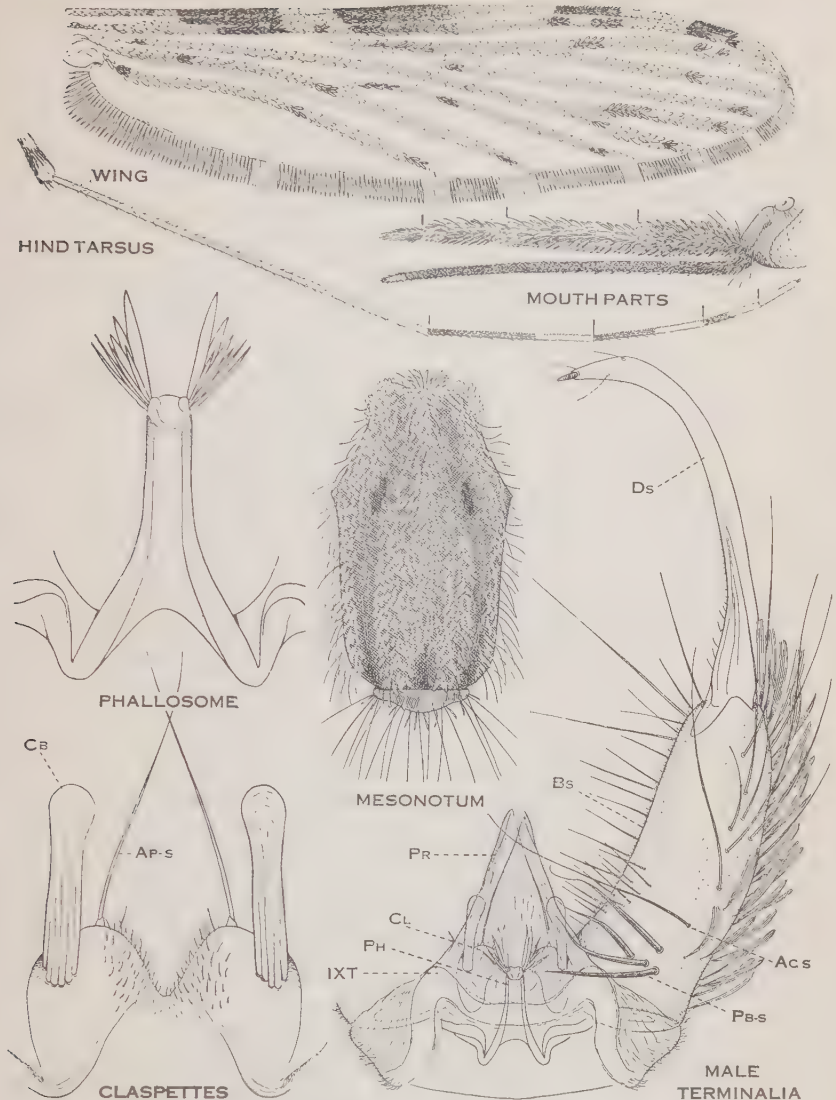
Identification. HEAD: clypeal hairs 2 and 3 simple or very finely feathered; inner clypeals (2) widely separated. THORAX: prothoracic hairs 1 and 2 with main shafts heavy, basal tubercles large but separate. ABDOMEN: palmate hair (1) on segment I with no flattened leaflets; lateral hair 6 of segment IV with 4 to 6 branches.

Habitat. Occurs especially in flowing streams and river beds. Also found in pools, ditches, rice fields, etc. In Netherlands Indies said to be found exclusively in the hills and mountains, especially mountain brooks. In Malaya predominantly in seepage.

Distribution. India, Ceylon, Burma, Malaya, Netherlands Indies, Borneo, Celebes, Thailand, Indo-China, South China, Philippines.

Illustrated specimens from (adults) Hong Kong; (larva, except pecten) Kolambagan, Lanao, Mindanao, Philippines (head outline reconstructed from skin); (pecten) Tayabas, Luzon, Philippines.

Note. Adults variable. *A. maculatus wilmori* (James), from Himalaya foothills, 2 to 8,000 feet, may be distinguished by much more profuse scaling of abdominal tergites. *A. theobaldi*, from India, is only distinguished by entirely white hind tarsal segment IV.

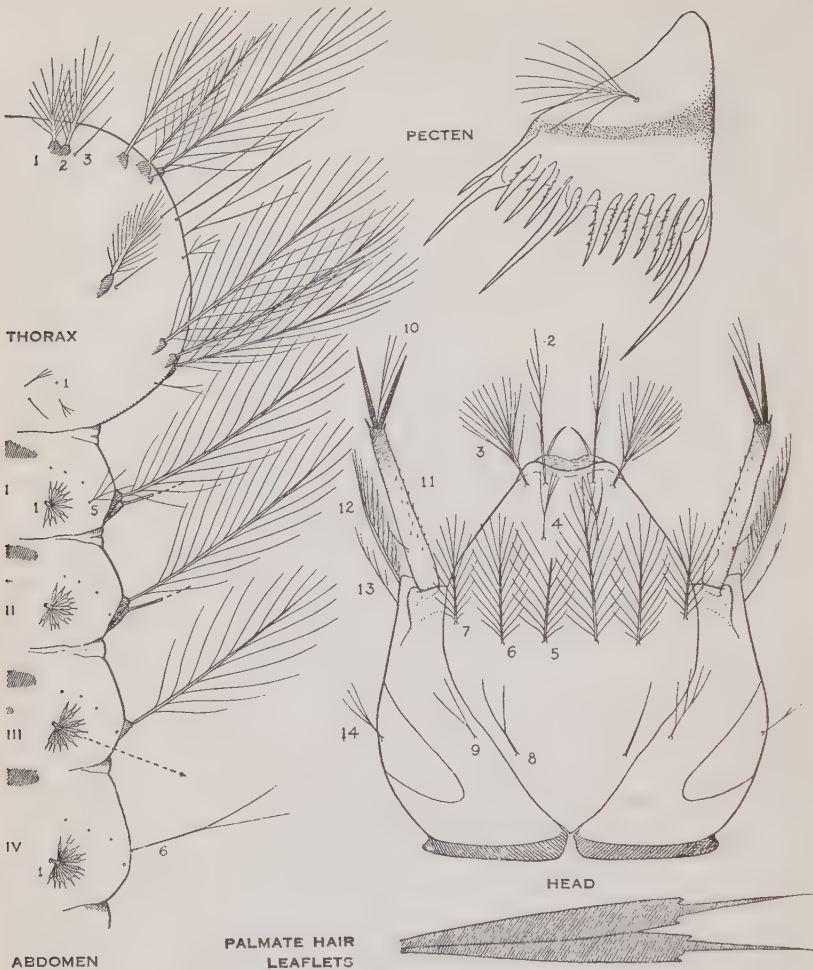


ANOPHELES (MYZOMYIA) PHAROENSIS Theobald, 1901

An important vector of malaria in the Nile Delta and Upper Nile Province of the Sudan, of little importance elsewhere.

Identification. ADULT FEMALE: A large pale grayish species. Palpus pale, shaggy with 4 paler bands and scattered paler scales. Mesonotum and dorsum of abdomen extensively covered with yellowish scales. Two dark "eye" spots on mesonotal integument. Lateral scale tufts project from abdomen. Wing with three prominent dark areas on costal region; dark spots on field very much reduced in size. Terminal hind tarsal segment entirely white, other segments with broad apical white band; terminal segment of fore- and mid-tarsus entirely dark; femora and tibiae with irregular bands, patches, and spots of pale scales. MALE TERMINALIA: no very distinctive features; phallosome with 6 to 8 leaflets; basistyle (Bs) with several relatively long hairs on inner distal portion.

Habits. Enters houses and bites man, though it prefers cattle. In Egypt, maximum abundance Aug. and Sept., minimum Feb. to April.



ANOPHELES (MYZOMYIA) PHAROENSIS Theobald, 1901

Palmate hair (1) of metathorax and many hairs of abdomen are omitted because of defects of the one available specimen.

Identification. HEAD: inner clypeal hairs (2) widely separated, weakly feathered; outer clypeals (3) densely branched, fan-shaped. THORAX: prothoracic hairs 1 and 2 with bases heavily sclerotized and fused; the shaft of hair 1 broad; metathoracic palmate hair (1) with leaflets weakly developed. ABDOMEN: palmate hairs (1) developed on segments I to VII, though decidedly smaller on segments I and II; leaflets of segment IV highly variable, may be either narrow with well developed apical filament or broad and prominently notched distad with no pronounced apical filament; pecten with well developed, stout denticles on pecten teeth. The two related species *A. squamosus* and *A. argenteolobatus* lack conspicuous denticles on pecten teeth.

Habitat. Breeds among dense growths of grass, reeds, or papyrus.

Distribution. Widespread in tropical Africa, and Nile Valley; also reported from Palestine. Type locality: Cairo, Egypt.

Illustrated specimens from (adult female) Sennar and (adult male) Wad Ashar, Luggard, Sudan; (larva) Ismailia, Egypt. Head hairs 5 to 9 after Evans, 1938.

LIST OF ANOPHELES OF THE OLD WORLD SHOWING RELATIONSHIP OF SPECIES

This systematic list of species of *Anopheles* is divided for convenience into sections covering three major geographic areas. Species of the Australian region are listed with those of Asia because of their small number and the close relationship of the two faunas. The list of species names has been taken from Russell, Rozeboom and Stone, 1943, "Keys to the Anopheline Mosquitoes of the World," and the systematic arrangement has been derived from many other authors. Species of *Bironella* are not included as the group is here regarded as a distinct genus. Only the more important synonyms are indicated. Subspecies are indented under the species name. The distributional data are given in a very general and abbreviated form. An asterisk (*) indicates that the species has been listed as an important vector of malaria in the above cited paper. A dagger (†) indicates that the species is treated in the "Mosquito Atlas."

THE ANOPHELES OF EUROPE, NORTH AFRICA, AND THE NEAR EAST

Genus *Anopheles* Meigen, 1818

Subgenus *Anopheles*

Series *Anopheles*

*maculipennis*¹

maculipennis Meigen, 1818. Sweden to Italy; S. Russia to Macedonia

**messae* Falleroni, 1926. Central Europe, North of Spain; Italy; Greece

melanoon

melanoon Hackett, 1934. Italian Peninsula

subalpinus Hackett and Lewis, 1935. Spain; N. Italy; Balkans

labranchiae

**labranchiae* Falleroni, 1926. Italy and adjacent islands; Spain; N. Africa

**atroparvus* Van Thiel, 1927. Palaearctic Region, British Isles to Japan

†*sacharovi* Favr, 1903. S. E. Europe; Near East; Central Russia; W. China

(= *elutus* Edwards)

†*claviger* (Meigen), 1804. Europe; N. Africa; Asia Minor; Turkestan

(= *bifurcatus* Meigen, not of Linnaeus)

marteri Senevet and Prunelle, 1927. Macedonia; Syria; Algeria

sogdianus Keshishian, 1938. Tadjikistan, Russia

**algeriensis* Theobald, 1903. Great Britain; Italy; Macedonia; N. Africa; Near East

apoci Marsh, 1933. Southwestern Persia

plumbeus Stephens, 1828. Europe to Caucasus and Asia Minor

Series *Myzorhynchus*

coustani

tenebrosus Dönitz, 1902. Egypt to Orange Free State

hyrcanus

hyrcanus (Pallas), 1771. Macedonia, Asia Minor, Near East

(= *pictus* Loew, 1845)

pseudopictus Grassi, 1899. Italy, Libya to Caspian Region

¹ This species, and the following through *sacharovi*, constitute the European *maculipennis* Complex.

Subgenus **Myzomyia** Blanchard, 1902Group **Myzomyia**

d'thali Patton, 1905. S. Algeria; Egypt to Northwest India
arabicus Christophers and Chand, 1915. Southeastern Arabia
sergentii (Theobald), 1907. N. Africa; Near East; Northwest India

Group **Pyretophorus**

†***gambiae** Giles, 1902. Widespread in Tropical Africa; occasionally Medit. Region

Group **Paramyzomyia**

brousesi Edwards, 1929. Southern Algeria
 †***multicolor** Cambouliu, 1902. North Africa; Anglo Egyptian Sudan; Near East
turkhudi Liston, 1901. Spain; Mediterranean Region to India
 (= *hispaniola* Theobald, 1905)
 (= *italicus* Raffaele, 1928)

Group **Neocellia**

†***superpictus** Grassi, 1899. South Europe to Persia and Northwest India
stephensi
 †***stephensi** Liston, 1901. Irak to India
pulcherrimus Theobald, 1902. India to Caucasus

Group **Cellia**

†***pharoensis** Theobald, 1901. Tropical Africa; Madagascar; Egypt; Palestine

ANOPHELES OF THE ETHIOPIAN REGION

(Africa south of Sahara, adjacent islands, and South-Western Arabia)

Based on A. M. Evans, Mosquitoes of the Ethiopian Region, II Anophelini, 1938.

Genus **Anopheles** Meigen, 1818Subgenus **Anopheles**Group **Anopheles**Series **Anopheles**

concolor Edwards, 1938. Kabila, Kwango Prov., Belgian Congo

Series **Myzorhynchus****coustani**

coustani Laveran, 1900. Most common East and South Africa
ziemanni Grünberg, 1902. Widely scattered, except S. Africa
tenebrosus Dönitz, 1902. Egypt to Orange Free State
paludis Theobald, 1900. Sierra Leone to Angola and Tanganyika
symesi Edwards, 1928. Uganda, Kenya, Lake Victoria
obscurus

obscurus (Grünberg), 1905. West Africa to Uganda
nowlini Evans, 1932. Liberia

Group **Christya**

implexus (Theobald), 1903. East Africa. Forest 3–5,000 feet.

Subgenus **Myzomyia** Blanchard, 1902Group **Eomyzomyia**

wilsoni Evans, 1934. Usambara Mts., Tanganyika

Group Neomyzomyia

ardensis (Theobald), 1905. East and South Africa

machardyi Edwards, 1931. Amani, Tanganyika

natalensis

natalensis Hill and Hayden, 1907. East and South Africa

multicinctus Edwards, 1930. East and South Africa

kingi Christophers, 1923. High elev., Uganda to S. E. Belgian Congo

dureni Edwards, 1938. Kwango Prov., Belgian Congo

cinctus (Newstead and Carter), 1910. Liberia; Gold Coast; Fernando Po

smithii Theobald, 1905. Sierra Leone; Liberia; Fernando Po

lovettae Evans, 1934. Amani, Tanganyika

***nili** (Theobald), 1904. Most of Ethiopian Region, though sporadic

Group Myzomyia

Subgroup I

funestus

†***funestus** Giles, 1900. Of widespread occurrence

confusus Evans and Leeson, 1935. East and South Africa, rare

imerinensis Monier and Treillard, 1935. Tananarive, Madagascar

fuscivenosus Leeson, 1930. Southern Rhodesia

rivulorum

rivulorum Leeson, 1935. East Africa to Transvaal

garnhamellus Evans and Leeson, 1937. East Africa

leesoni Evans, 1931. East Africa to Transvaal

culicifacies

adenensis Christophers, 1924. Southern Arabia

longipalpus (Theobald), 1903. East Africa to Zululand

marshallii

marshallii (Theobald), 1903. Southern Rhodesia; Transvaal, Zululand

pitchfordi (Giles), 1904. Eshowe district, Zululand

gibbinsi Evans, 1935. Uganda; Kenya; East Belgian Congo

mousinhoi De Meillon and Pereira, 1940. Mozambique

moucheti

***moucheti** Evans, 1935. Central Belgian Congo to Uganda

***nigeriensis** Evans, 1931. Southern Nigeria

***hargreavesi** Evans, 1927. West Africa; Belgian Congo

mortiauxi Edwards, 1938. Kabila, Kuwango Prov., Belgian Congo

harperi Evans, 1936. Kericho and Kitale, Kenya

flavicosta Edwards, 1911. Northern Nigeria and Ashanti

domicolus Edwards, 1916. Northern Nigeria; Gold Coast; Uganda; Rhodesia

lloreti Gil Collado, 1935. Fernando Po

barberellus Evans, 1932. Liberia, Sierra Leone

austeni Theobald, 1905. Bihé, Angola

***hancocki** Edwards, 1929. West Africa to Uganda

theileri

theileri Edwards, 1912. Transvaal; Elizabethville, Belgian Congo

broheiri Edwards, 1929. Gold Coast

seydeli Edwards, 1929. Katanga District, Belgian Congo; N. Rhodesia

septentrionalis Evans, 1934. Torit, A.-E. Sudan; Uganda

tcchedii De Meillon and Leeson, 1940. Bechuanaland

distinctus

distinctus Newstead and Carter, 1911. Belgian Congo to Bechuanaland

ugandae Evans, 1934. Kampala, Uganda

wellcomei Theobald, 1904. Anglo Egyptian Sudan; Northern Nigeria
walravensi

walravensi Edwards, 1930. Eastern Belgian Congo; Northeastern Rhodesia

milesi De Meillon and Evans, 1935. Southern Rhodesia

michaeli De Meillon and Leeson, 1940. Northern Rhodesia

schwetzi Evans, 1934. Kalunga, Katanga, Belgian Congo

d'thali Patton, 1905. Southern Algeria to Northwest India

erythraeus Corradetti, 1939. Eritrea

Subgroup II

rhodesiensis Theobald, 1901. Sierra Leone to Kenya, south to Transvaal

rupicolus Lewis, 1937. East central Anglo Egyptian Sudan

aurinus Edwards, 1940. Southern Rhodesia

cameroni De Meillon and Evans, 1935. Cape Province, South Africa

demeilloni

demeilloni Evans, 1933. East Africa, south to Zululand

carteri Evans and De Meillon, 1933. Transvaal; Natal

keniensis Evans, 1931. Kenya; Tanganyika

garnhami

garnhami Edwards, 1930. Abyssinia to Belgian Congo

walshi Evans and De Meillon, 1933. Transvaal

freetownensis Evans, 1925. Sierra Leone; Southern Nigeria

macmahoni Evans, 1936. Isiolo, Kenya

Group Pyretophorus

christyi (Newstead and Carter), 1911. East Africa

†***gambiae** Giles, 1902. Widespread in Tropical Africa

Group Paramyzomyia

Subgroup I

cinereus Theobald, 1901. East and South Africa

turkhuhi Liston, 1901. Anglo Egyptian Sudan; Aden; Iran; India

Subgroup II

listeri De Meillon, 1931. South Africa

†***multicolor** Cambouliu, 1902. Anglo Egyptian Sudan; North Africa and Near East

Group Neocellia

rufipes

rufipes (Gough), 1910. Northern Nigeria to Kenya, south to Transvaal

ingrami Edwards, 1929. Sierra Leone to Northern Nigeria

brunnipes (Theobald), 1910. Western Belgian Congo; Angola

pretoriensis (Theobald), 1901. Gold Coast to Kenya, south to Natal

maculipalpis (Giles), 1902. Gold Coast to Kenya, south to Natal; Angola

dancalicus Corradetti, 1939. Abyssinia

Group Cellia

†***pharoensis** Theobald, 1901. Tropical Africa; Madagascar; Egypt; Palestine

squamosus

squamosus Theobald, 1901. Tropical Africa; Madagascar

cydippis De Meillon, 1931. Zululand

entebbiensis Evans, 1938. Southern Abyssinia; Uganda

jacobi (Hill and Haydon), 1907. Natal

argenteolobatus Gough, 1910. Angola; Eastern Belgian Congo; Rhodesia

ANOPHELES OF ASIA AND THE AUSTRALIAN REGION

Based chiefly on Christophers, Fauna of Brit. India, 1933; Gater, Anopheline Imagines of Malaya, 1935; and Swellengrebel and Rodenwaldt, Die Anophelen von Niederländisch-Ostindien, 1932.

Genus **Anopheles** Meigen, 1818Subgenus **Anopheles**

Group Anopheles

Series Anopheles

labranchiae Falleroni, 1926

***atroparvus** van Thiel, 1927. Palaearctic Region, British Isles to Japan

(= *maculipennis*)

†**sacharovi** Favr, 1903. Southeastern Europe; Near East; Central Russia; Western China

(= *elutus* Edwards)

habibi Mulligan and Puri, 1936. Baluchistan

aitkenii

aitkenii James, 1903. India; Malaya

bengalensis Puri, 1930. India to Java and Philippines

palmaris (Rodenwaldt), 1926. Sumatra; Java; Borneo

insulaeflorum (Swell. and Swell.), 1919. India; Ceylon; to New Guinea; Philippines

sintonoides Ho, 1938. China; Hainan

pinjarensis Barraud, 1932. Punjab, India

culiciformis Cogill, 1903. West Coast of India

sintoni Puri, 1929. Southern India

barianensis James, 1911. North-West Himalayas of India; 5-8,000 feet

wellingtonianus Alcock, 1912. Malaya

lindesayi

lindesayi Giles, 1900. Montane areas of Northern India

cameronensis Edwards, 1929. Malaya

nilgircus Christophers, 1924. 6-8,000 feet. Southern India

benguetensis Kink, 1931. Philippines

japonicus Yamada, 1918. Japan; Formosa; Northern China in high altitudes

gigas

gigas Giles, 1901. Southern India and Ceylon over 5,000 feet

simlensis (James), 1911. United Provinces to Indus, Himalayas, India

baileyi Edwards, 1929. Northern India and Burma; Tibet; China; Formosa

refutans Alcock, 1913. Ceylon

sumatrana Swellengrebel and Rodenwaldt, 1932. Sumatra

formosus Ludlow, 1909. Philippines

edwardsi Yamada, 1925. Japan

atratis Skuse, 1888. Australia

stigmaticus

stigmaticus Skuse, 1888. Australia

corethroides Theobald, 1907. Queensland, Australia

Series Myzorhynchus

hyrcanus

hyrcanus (Pallas), 1771. Macedonia; Asia Minor; Near East.

***nigerrimus** Giles, 1900. British India to Celebes and Philippines

†**sinensis** Wiedemann, 1828. Upper Burma to Japan and Philippines

lesteri Baisas and Hu, 1936. Philippines

pseudosinensis Baisas, 1935. Philippines

sineroides Yamada, 1925. Japan

koreicus Yamada and Watanabe, 1918. Korea; Japan

montanus Stanton and Hacker, 1917. Malaya

novumbrosus Strickland, 1916. Malaya

separatus Leicester, 1908. Malaya

hunteri (Strickland), 1916. Malaya

baezai Gater, 1933. Malaya

gateri Baisas, 1936. Philippines

similissimus Strickland and Chowdhury, 1927. Malaya

†***umbrosus** (Theobald), 1903. Assam, India; Malaya to Celebes and Tonkin

albotaeniatus (Theobald), 1903. Malaya; Netherlands Indies; Northern Borneo

barbirostris

***barbirostris** Van der Wulp, 1884. Brit. India to Philippines and New Guinea

vanus Venhuis, 1939. Celebes

ahomi Chowdhury, 1929. Assam, India

bancroftii

bancroftii Giles, 1902. New Guinea; northern Australia

barbiventris Brug, 1938. Celebes

barbumbrosus Strick. and Chowd., 1927. Sumatra to Celebes and Moluccas

pseudobarbirostris Ludlow, 1902. Philippines

Series Memnemyia

brevipalpis Roper, 1914. Malaya; Bangka Island; Brit. N. Borneo

Series Lophoscelomyia

annandalei

annandalei Baini Prashad, 1918. India; Java

(= *djajasanensis* Brug, 1926. Java)

interruptus Puri, 1929. India; Ceylon; Indo-China

asiaticus (Leicester), 1904. Malaya

Subgenus **Myzomyia** Blanchard, 1902

Group Neomyzomyia

***pattoni** Christophers, 1926. China, north of 30° N.

aurirostris (Watson), 1910. Malaya

***kochi** Dönitz, 1901. Northeastern India to Moluccas; Philippines

kolambuganensis Baisas, 1932. Philippines

leucosphyrus

***leucosphyrus** Dönitz, 1901. British India to Celebes and Philippines

hackeri Edwards, 1921. Malaya

balabacensis Baisas, 1936. Philippines

riparis King and Baisas, 1936. Philippines

cristatus King and Baisas, 1936. Philippines

amictus Edwards, 1921. Australia; Dutch N. Guinea

annulipes

†***annulipes** Walker, 1865. Australia; Tasmania; (New Guinea)

mastersi Skuse, 1888. Queensland, Australia

meraukens Venhuis, 1932. Dutch New Guinea

punctulatus

†***punctulatus** Dönitz, 1901. Australia; New Guinea; Moluccas; Melanesia

***moluccensis** (Swell. and Swell.), 1920. Australia; Moluccas; New Guinea and adjacent islands

novaguinensis Venhuis, 1933. Dutch New Guinea

- longirostris** Brug, 1928. Dutch New Guinea; Moluccas; New Ireland
(= *annulata* Brug, 1930)
tessellatus Theobald, 1901. British India to Java and Philippines
watsonii (Leicester), 1908. Malaya

Group Myzomyia

- d'thali** Patton, 1905. Southern Algeria; Egypt to Northwestern India
sergentii Theobald, 1907. N. Africa; Near East; Northwestern India
culicifacies
†***culicifacies** Giles, 1901. British India; Siam; Tonkin
†***fluviatilis** James, 1902. Turkestan; British India; Siam; Tonkin
minimus
†***minimus** Theobald, 1901. British India to Celebes; Southern China; Formosa
***flavirostris** (Ludlow), 1914. Philippines
***varuna** Iyengar, 1924. British India
filipinae Manalang, 1930. Philippines
***mangyanus** (Banks), 1906. Philippines
***aconitus** Dönitz, 1902. British India to Celebes; Indo-China
jeyporiensis
***jeyporiensis** James, 1902. Eastern India
***candidiensis** Koidzumi, 1924. Formosa; China; Tonkin; Burma; India
majidi Young and Majid, 1928. India

Group Pseudomyzomyia

- subpictus**
†***subpictus** Grassi, 1899. India; Malaya to New Guinea
***malayensis** Hacker, 1921. Malaya
indefinitus (Ludlow), 1904. Philippines
vagus
vagus Dönitz, 1902. British India to New Guinea and Southern China
limosus King, 1932. Philippines
parangensis (Ludlow), 1914. Philippines; Celebes
ludlowi (Theobald), 1903. Philippines; Formosa
litoralis King, 1932. Philippines
†***sundaicus** (Rodenwaldt), 1926. Coasts of India to Siam and Netherlands Indies

Group Paramyzomyia

- †***multicolor** Cambouliu, 1902. Anglo Egyptian Sudan; North Africa and Near East
turkhudi Liston, 1901. Spain; Mediterranean Region to India

Group Neocellia

- †***superpictus** Grassi, 1899. Southern Europe to Persia and Northwestern India
moghulensis Christophers, 1924. India; (Turkestan?)
stephensi
†***stephensi** Liston, 1901. Irak to India
mysorensis Sweet and Rao, 1937. India
maculatus
†***maculatus** Theobald, 1901. British India to Netherlands Indies; Philippines; Southern China
willmori (James), 1903. Himalayas, 2-8,000 feet, of India and Burma

- karwari** (James), 1903. British India to N. Guinea and Philippines
jamesii Theobald, 1901. British India; Yunnan; Indo-China
theobaldi Giles, 1901. India
errabundus (Swellengrebel), 1925. Borneo
†***annularis** Van der Wulp. 1884. India; Ceylon to Lesser Sunda Islands and Philippines
(= *fuliginosus* Giles, 1900)
***philippinensis** Ludlow, 1902. India; Burma to Netherlands Indies
pallidus Theobald, 1901. British India
pulcherrimus Theobald, 1902. India to Caucasus
ramsayi Covell, 1927. British India; Siam; Sumatra; Java
schüffneri Stanton, 1915. Sumatra; Java
splendidus Koidzumi, 1920. India; Burma; Siam; Tonkin; Southern China; Formosa
incognitus Brug, 1931. Dutch New Guinea

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